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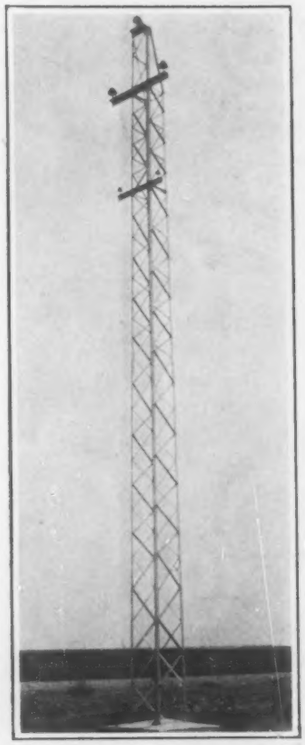
11 Kv. Steel Pole Line along Main Canal of West Stanislaus Irrigation District



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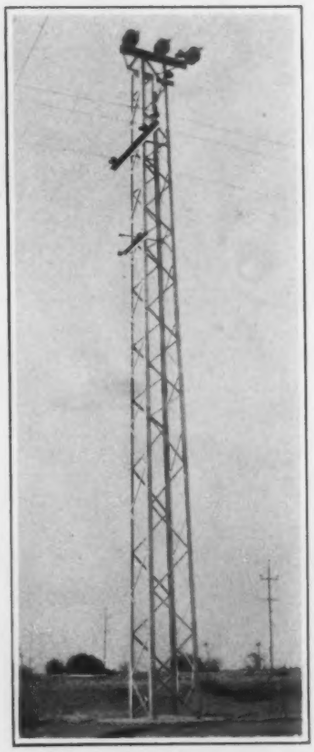

90° Dead end pole

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More Power for San Diego

By C. W. Wiggins

Superintendent of Electric Production,
San Diego Consolidated Gas & Electric Company, San Diego

With steam-electric generating plants as the only developed source of electric energy on its system, the San Diego Consolidated Gas & Electric Company has been paying particularly close attention to the development and modernization of these facilities. The company serves San Diego and nearby territory and its system embraces almost everything from lightly loaded rural areas to congested urban sections. During the past ten years its generating capacity has been increased from about 10,000 kw. to a present total of some 78,000 kw. The recent addition of a 28,000-kw. steam unit at Station B in San Diego, together with stabilizing interchange connections to the north and east, guarantee adequate service of a highly reliable character for the southwestern corner of California.

By 1920 the demand for electric service had become so great that it was necessary to increase the generating capacity. Station A, with its rated turbine capacity of 10,000 kw., could not very well be expanded, so the company purchased the power plant of the San Diego Electric Railway Company in January, 1921. This station, located at Kettner Blvd. and E St., occupied an area of 179 ft. on Kettner Blvd. and 164 ft. on E St. and after the purchase was known as Station B.

A night view of the new Station B showing the architectural beauty of a typical modern steam plant.

Nearly all of the equipment excepting a 6,000-kw., 2,300-volt turbine unit and four motor-generator sets for supplying power to the street railway system, was removed in remodeling the plant. By 1927 seven 1,153-hp. B.&W. cross-drum boilers and two 15,000-kw. General Electric 12,000-volt turbines had been installed in the old building and it was necessary again to expand. About that time the adjoining 121 ft. on Kettner Blvd. and 175 ft. on Broadway was purchased and plans were made for an addition to the station.

The new addition to the station which was built during 1928 is a fine example of a modern station for turbines and electrical equipment. The boiler room was not extended, but an extension will be required in the near future.

The Byllesby Engineering and Management Corporation, engineers and managers of the San Diego Consolidated Gas & Electric Company, designed the new station. It was erected by H. H. Watson, general superintendent of construction. Construction work was started in January, 1928, and the new 28,000-kw. turbine was put on the line on Nov. 15, 1928.

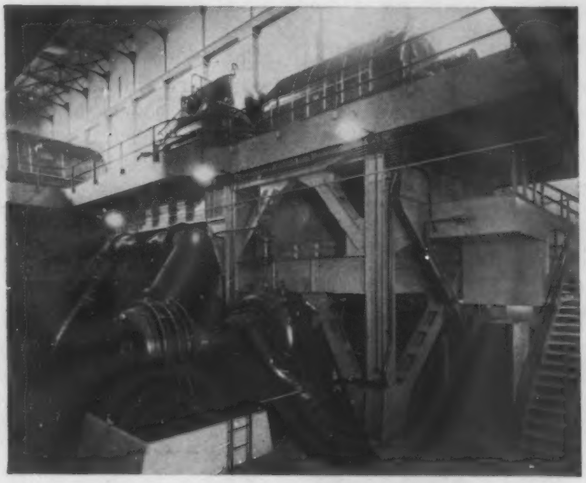
The new building occupies the remainder of the city block on Kettner Blvd. between the old building and Broadway. It has a frontage

of 140 ft. on Kettner Blvd. and 88 ft. on Broadway. An area at the northwest corner of the block, 87 ft. on Broadway by 121 ft. adjoining the Santa Fe Railway will be occupied later by an extension of the biulding con-

The San Diego Consolidated Gas & Electric Company's new stem-electric generating station is prominently situated and hence special attention was given to architecture.

taining electrical equipment and by an extension of the boiler room.

When the new building was constructed the north wall of the old building was removed, thus providing a turbine room 267 ft. 6 in. long and 56 ft. 11½ in. wide. Roof trusses are 55 ft. above the turbine room floor and 77 ft.

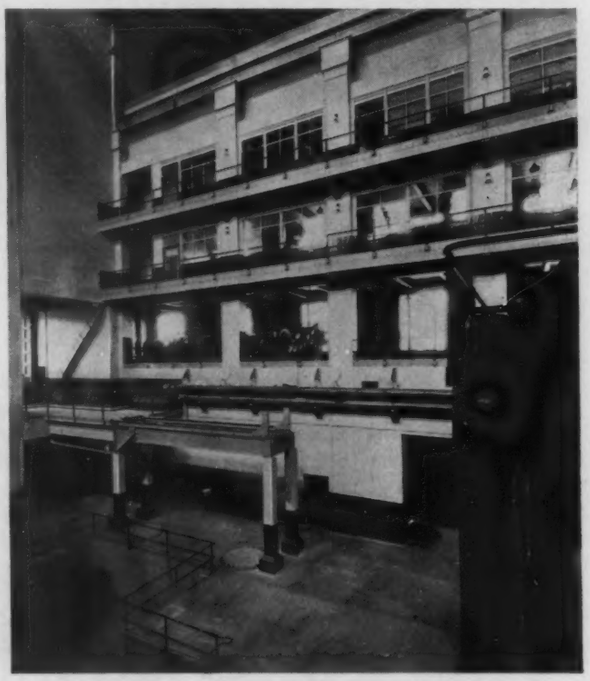


Circulating pump and structural steel foundation for 28,000-kw. unit.

above the basement floor of the new building. A 65-ton Shaw crane operates over the whole area of the old and new stations.

Before the building could be constructed it was necessary to build an extension of the circulating water system which supplies sea water by gravity flow from San Diego Bay. Two reinforced concrete tunnels 4 ft. x 8 ft. 6 in. supply sea water to the new turbine and provide capacity for a future one. Above these two intake tunnels are two similar discharge tunnels. The bottoms of the intake tunnels are 33 ft. below the street level and 1.6 ft. below mean low tide level. Before installing building foundations 542 25-ft. concrete piers were driven.

The new station is a "Class A" steel frame building with reinforced concrete floors and walls. The architecture is of the Spanish type to harmonize with other modern buildings in the neighborhood. Since it is prominently located on Broadway, the principal business



Partial view of turbine room showing foundation for a future unit and auxiliary equipment and office space at the side.

street of the city, near the Union railway station and steamship wharves, its appearance was considered to be of importance. It is much admired, especially at night when it is beautifully illuminated with floodlighting.

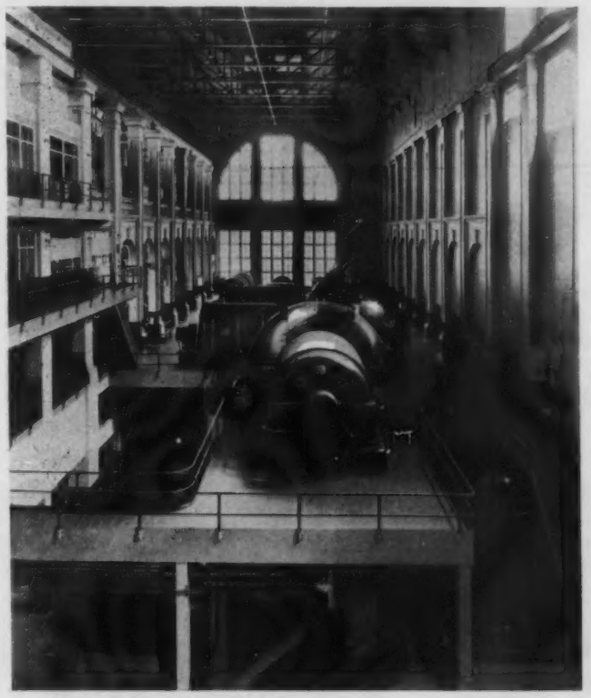
The 30 ft. on the north, fronting on Broadway, contains five floors of electrical equipment and a basement storeroom. There are also in this section stairways and halls, an automatic elevator and a large entrance and railroad track for receiving into the building cars of material which can be unloaded with the 65-ton crane. Nine-inch square red tiles are used on the five floors of the electrical galleries, on the six floors of the stair and elevator landings, and on the main turbine-room floor.

Two sets of 12,000-volt buses and duplicate oil switches are installed so that any turbine, transformer bank or feeder can be operated on either bus.

On the east or Kettner Blvd. side of the building are five floors and a basement. These floors are all 16 ft. in width and extend the full length of the new building. Stairways, halls and elevator are provided in this portion of the building. The basement contains the main

wash room, locker room, rest room and seven 2,000-kw. 2.3/12-kv. transformers. One transformer is a spare for either of the two banks. The mezzanine floor contains a conduit room next to the building wall and inside of this are an exciter switchboard, turbine-generator field rheostats, storage battery and charging set, and a switchboard for 110- and 220-volt station light and power.

The next floor is the main turbine-room floor and is called the first floor. On this floor are two 300-kw., 250-volt dual-drive exciters driven by induction motors and Terry turbines. Oil switches in steel enclosures for the control of 2,300-volt motors, transformer banks and similar equipment in the station also are placed on this floor. On the second floor are located a lavatory and a large office for the station engineer, the station electrician and the test engineer, who also is the chemist in charge of the laboratory. The south 53 ft. of this floor contains the station switchboard. On the third floor are a lavatory, three offices and a laboratory. The three offices are for the department superintendent, the assistant superintendent and the clerks. A single room 117 ft. long occupies the fourth floor, now used for plant record files. A part of it later will be used as a drafting room. The room also can be used for meetings of the employees.



Combined turbine rooms of old and new buildings as seen from an elevted position in the new portion. The 28,000-kw. unit is in the foreground.

The new 28,000-kw., nine-stage General Electric turbine-generator unit is built for 225 lb. per square inch gage pressure at 700 deg. F. Steam is bled from the third, fifth and seventh stages for feed-water heating and steam from the third stage also is used in the city steam heating system which does not operate above 20 lb. pressure.

Condensate from the hotwell pump passes through the air ejector condensers, the seventh stage and the fifth stage heaters, to the open feed-water heaters. From the open heaters the condensate and make-up water is pumped through the third stage heater to the boilers with boiler feed pumps.

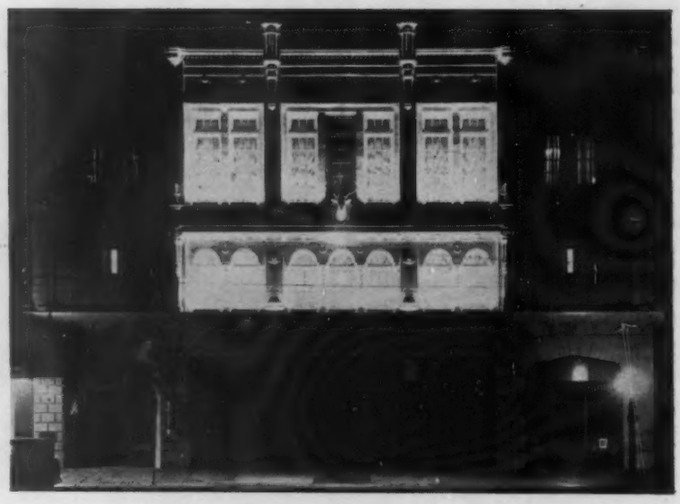
With rated load on the turbine the water temperatures are as follows: Leaving the ejector condensers, 90.6 deg.; leaving the seventh stage heater, 160 deg.; leaving the fifth stage heater, 209 deg.; leaving the open heater, 212 deg.; and leaving the third stage heater, 276 deg. F.

The 12,470-volt generator is cooled by a closed system of ventilation by recirculating air through a General Electric surface type air cooler using condensate from the hotwell pump to cool the air. Provision has been made for the use of sea water in the cooler if required.

The 30,800 sq.ft. Worthington condenser is a two-pass, two-compartment unit and is so arranged that one-half of it can be taken out of service for cleaning or repairing leaks while the turbine continues in service. The 36-in. circulating pump is designed to deliver 32,000 g.p.m. against a total dynamic head of 19 ft. with an efficiency of 82 per cent. A Worthington double 30 cu.ft., two-stage air ejector is used for exhausting air from the condenser. The turbine unit itself is supported on a heavy steel structure, a type of turbine support that has been used in Byllesby plants for about sixteen years. Foundations and hotwell pit are ready for the next turbine whenever it may be required.

One of the switching galleries in the new Station B where attention was given particularly to safety, accessibility and cleanliness.

LIGHT *for* Ritual and Recreation



The present three stories floodlighted at night in color.

Fresno's New Elks' Home Is Modern in Design and in Lighting and Electrical Provisions for the Future.

By

CARL F. WOLF

Illuminating and Electrical Engineer, Valley Electrical Supply Company, Fresno.

"All the World's a Stage."—*Shakespeare.*
"Let there be light."—*Moses.*

ASKED to tell how I did it, "What's your lumens per foot?" "Your voltage per foot?" was like asking an artist how many tubes each of red, blue, orange and green paint he used to create that much admired *Sunrise in the Desert*, or asking a Rodin what kind of wire and steel frame work gives form to his *Thinker*.

In my answer telling why, instead of how, there lies a story that has its beginning in the hot days of Summer, 1927, when it was much easier to daydream alongside a cascading brook in the high and cool Sierra than to think up a lighting layout "for another lodge building." But orders are orders, and when H. H. Courtright of the Valley Electrical Supply Company, of merchandising fame, loans me to an architect to counsel and help prepare electric plans and specifications, there is nothing else to do but to take off my coat and collar and go to it.

Architect's sketch of the future six-story building, three stories of which are now completed.

Ernest J. Kump Company, architects and engineers of Fresno, said, "We want something different, no stereotyped lodge home will do," and invited my collaboration to create something distinctive for Elkdom. How well we succeeded we leave you to judge from the pictures which speak for themselves and from the admiration expressed by Elks themselves, summed up by Murray Hulbert, grand exalted ruler and past exalted ruler of New York Lodge No. 1, when he said, without simply wishing to compliment, "You have set a building standard for Elkdom—one which I shall recommend for all future Elk temples. Your lighting equipment approximates to the fullest the spirit and order of our beautiful ritual and the purpose of our lodge."

I said "we"—because Ernest J. Kump, his designers and I, really did work together from the very inception instead of merely "adorning" the architectural creation with a lighting and electrical layout later, as is usually the case, seldom resulting in a harmonious and working proposition.

I prefaced my remarks with two quotations, very apropos when considering the creation of a lodge and club home, particularly the lodge hall around which the rest of the rooms and conveniences are built. These two quotations governed every choice of architectural form and shape, design and decoration, once the size was determined.

Why? A lodge room must first of all invite rest and complete change in thought from the day's business cares and impressions; and secondly, must be expressive of the character and work of the particular lodge or club under consideration because of the multitude of such organizations bidding for one's time and attention. And all that may be summed up in the one word, "atmosphere." Why should Elkdom not have an atmosphere, distinct and separate from that of the Masonic orders, I. O. O. F., K. of C. or other such organizations, one especially suited to its peculiar needs and purposes?

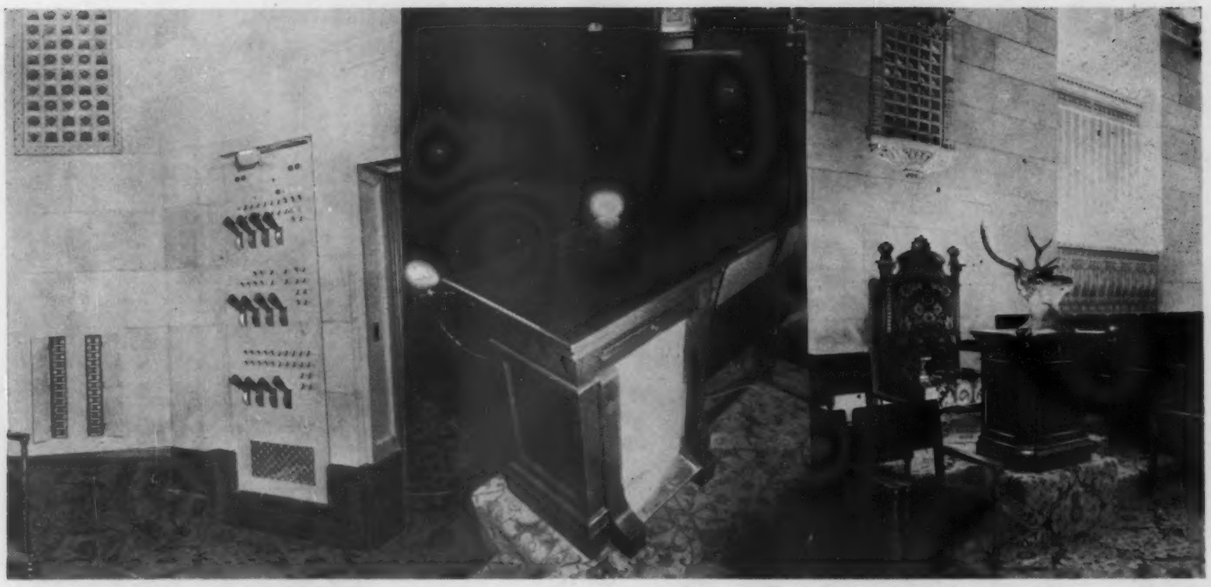
Now what constitutes atmosphere but the complete

Above: The entire lodge room during ritual or (right) fully illuminated. The subdued lighting in color at the wall panels, the lighted star lowered over the altar from the ceiling motif, the spot light on the altar, the lighted clock over the stage and spots on the officers' chairs contribute to the atmosphere of the occasion. For the festive occasion all colors and white make the lodge room a gala ballroom.

Below: A typical exit and door light installation in the lodge room, each on separate circuit control. Above the door is one of the vento grilles through which comes the light blue of outdoor sky. A key switch in this doorway gives control of the clock over the stage procenium.

Above: Forestage lighting showing spots for officers' stations, clock in procenium and lower pipe rail for mounting Shakespearian curtain for use as a stage. Hidden footlights can also be brought into play.

Center: The entire illumination is carried by means of concealed troughs of lighting units in three colors and white located in the decoration of the room. Arch-like recesses in the wall spaces furnish space for two sources of light, one playing on long flutings, the upper on a plain wall surface. In the ornaments at the tops of the colum-like spaces other lighting is placed. The grille vent provides another source of color. Finally, the stations themselves are individually lighted from within themselves. Convenience outlets at the base of the stations furnish sources for additional current if desired.



Lodge room light control and dimmer board, with forced ventilation. Fuse cabinet at lower left and one of the illuminated vento plaster grilles above.

A typical officer's station. Two small floods are mounted at corners. A reflector is mounted in the base to shine upward and a local 3-way switch gives control.

Station with Elk's head, showing illumination on head, chair and the wash of light from behind the chair which kills shadows on the back wall.

influence exerted harmoniously by architectural form and shape, detail and decoration, made manifest and blended by illumination—yes, if possible, changed by illumination to fit the particular mood of the particular exercise and time?

Form, shape, detail and decoration are fixed elements, but artificial illumination can be variable, even as solar illumination is variable, and therefore reactive upon the emotional senses of man. A wise Creator did not make light a fixed proposition, but has from the early dawn of man's existence, motivated him through the influence of light upon his emotions, from the awakening dawn, through a work-inspiring day, to the rest-inducing sunset.

Artificial illumination must approximate that influence to be effective. That very sales argument sold the architects on the relative importance of proper illumination and the electrification to bring it about.

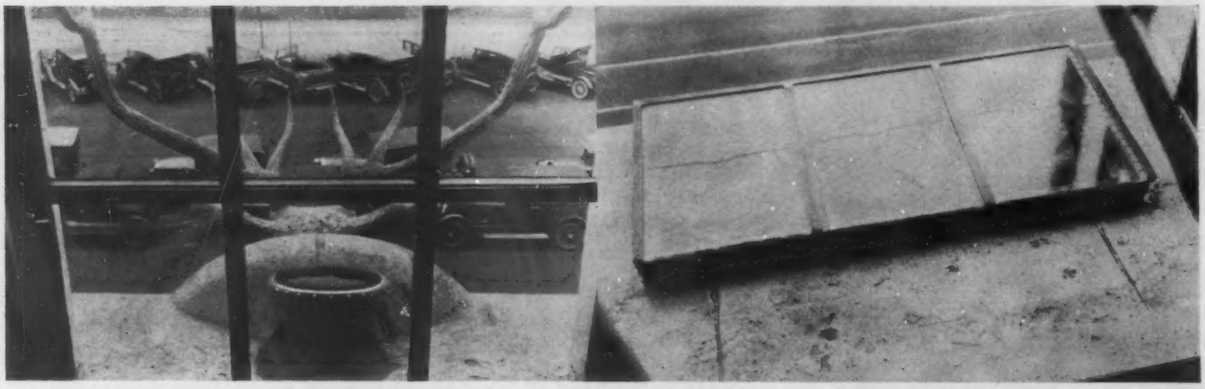
"All the world's a stage" is the only excuse for the rituals and ceremonials which differentiate lodges and clubs. It gives everyone the privilege to act and dress up at least once in a while and lifts man out of the thraldom of everyday life.

In other words a large room, besides being a meeting place, cold and formal, must have a stagey atmosphere where everyone becomes part of the play without prompting. And so we treat the whole as a stage with all the subtle influences for atmosphere that light thus exercises under the hand of an experienced electrician. (Such an "office" has been created at this lodge, choosing a member identified with the electrical industry.)

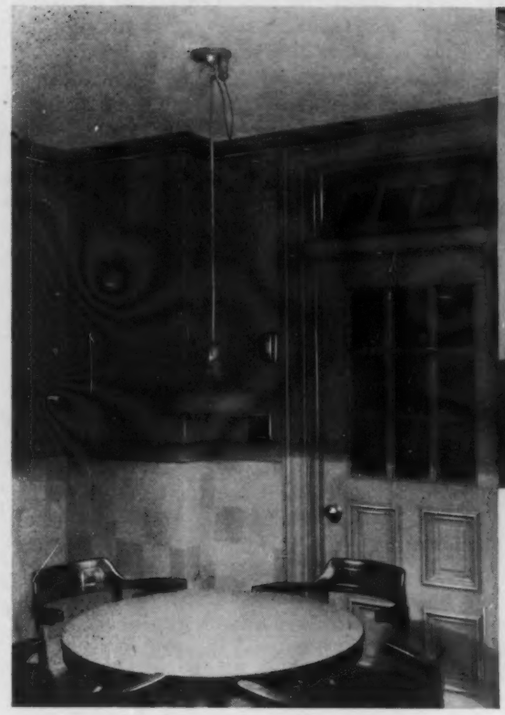
The Ritual Lighting

So, entering the lodge room, the inquisitive visitor finds the main control board adjacent to the Tyler's position. It is equipped with appropriate switches and dimmers and can be used to change the atmosphere of the hall to meet every spirit and mood of the ritual and the diversified uses to which the hall may be put.

Light sources that must not be confused with cove lighting are created into the very architecture of the



Left: The special flood placed to light the flag at the top of the third story. *Left*: One of the several three-reflector floodlighting units to light the spandrels.



Left: Special lighting units made of R.L.M. reflector for card room. It can be unhooked and removed when room is used for other purposes. *Above*: The main lounge. Note the outlets above the tapestries for special picture lighting. This room is abundantly supplied with convenience outlets.

room. By means of multiple color control these bathe the room in all the subtle shades of the rainbow or the season. Some of the light sources are low enough to be immediately above the heads of the audience, and thus by reason of the intensity contrast, shade the assembly almost to the point of obscuring it. This scheme is used during initiation and the opening exercises of the lodge.

The various officers' stations can be flooded individually and collectively by lights within the base of each station pedestal, augmented by miniature spots as shown in one of the illustrations. To offset any excessive and therefore grotesque shadows against the wall, the back of each officer's chair is equipped with suitable reflectors to wash out the shadows. Each officer can control his own station, or all stations may be doused by the electrician from the control panel.

Special attention has been paid to the groups of officers' chairs which are placed upon the forestage. This equipment is also illustrated. In addition to projectors trained on stations and flag, ample additional equipment is installed to augment stage borders, if the forestage is used in connection with the stage proper. For such occasions a Shakespearian curtain is suspended from the lower pipe hanger, shown under the projector supports in one photograph.

For Festive Occasions

To give the lodge room a festive atmosphere appropriate for formal dances, there are concealed sources of white light not only in the wall ornaments but also in the center ceiling decorative motif, which is equipped with 24 crystal pendants, flooded by concealed color lights, and themselves concealing 200-watt X-ray beehive reflectors.

In the center of the ceiling motif there is provided an illuminated star. Upon pressing two buttons this may be slowly and majestically lowered over the altar in the totally dark hall during the address to the "Star of Fidelity" by the officiating brother, who in turn is under a beam of light from a spot concealed within the ceiling motif.

In addition to the illumination described the decorative vento-grilles of the lodge room have concealed X-ray scoopettes lighting up the vent shafts, which are painted turquoise blue. This gives to the audience the appearance of openings into the blue evening sky, instead of the usual black spots left by such vento-grilles.

The entrances and exits not only have exit markers but door lights illuminating from concealed sources the heavily paneled doors. The organ balcony is flooded for concert work by border lights with projectors concealed in the ceiling. Convenience outlets are provided at each officer's station in the center of the lodge room and at other appropriate locations.

The stage proper is equipped with a unit type border complete with a full complement of color screens. Ample receptacles and plug outlets are provided in the baseboard of stage as well as on spot balconies, into which wing lights and spots may be plugged. Portable footlights to be set into the steps leading to the stage on each side of the exalted ruler's pedestal complete the stage equipment.

The Eleventh Hour

The clock over the proscenium arch has an illuminated face synchronized with the chimes for striking the hours. The automatic electric device for this is put into operation by a key switch adjacent to the secretary's desk.

Return call visual and buzzer signals are installed between the lodge room panel, stage panel, organ console and the fireproof moving picture booth, which is concealed behind a duplicate of the master organ screen.

The Other Club Rooms

The visitor, inspecting the club's other home appointments, will discover many well studied departures from the usual, such as the special lighting equipment of the

card rooms, officers' dining room, swimming pool, handball courts, and gymnasium.

The handball courts are lighted from floodlighing projectors installed on the spectators' balcony. To offset the excessive double shadows against walls, there are placed absolutely flush in the ceiling two units with three 200-watt reflectors behind a wire-glass cover.

Special fixtures in the card room, constructed of R.L.M. reflectors with louvre spiders, are hooked to the canopy to allow quick removal if rooms are to be used temporarily for other purposes.

All lounging rooms, the writing room, and the ladies' smoking room with its dressing room, are lighted in keeping with the period design prevailing, either by ceiling or bracket outlets, with ample convenience outlets scattered according to a somewhat permanent furnishing plan, and many additional Frank Adams fan hanger outlets for the suspension of lighting units for the illumination of pictures and tapestries.

The swimming pool is illuminated by Dolphin brackets, set within the stencil pattern on each side of the four columns and walls.

A fully equipped electro-therapeutic department adjoins the well appointed hydro-therapeutic Turkish and Russian bath department with its well illuminated and ventilated shower, dressing and locker rooms.

For the Future

The electrification of this club home as described and in many of its other appointments is up-to-date and ample for the proposed future three stories. A basement transformer vault and main switchboard of sufficient size have been provided for this later addition. A special removable slab of concrete in the passageway to the alley over the transformer vault and provision for block and tackle supports permit quick changing of transformer in case of breakdown, making it unnecessaary to transport this heavy equipment through the many and devious passages and stairways to the basement.

The high-tension oil circuit breaker in the transformer vault is remote controlled from the switchboard room through a bell crank system in a steel covered concrete trench traversing the gymnasium apparatus room that separates the transformer vault and switchboard rooms. The latter is glass enclosed to display the up-to-date safety type main switchboard.

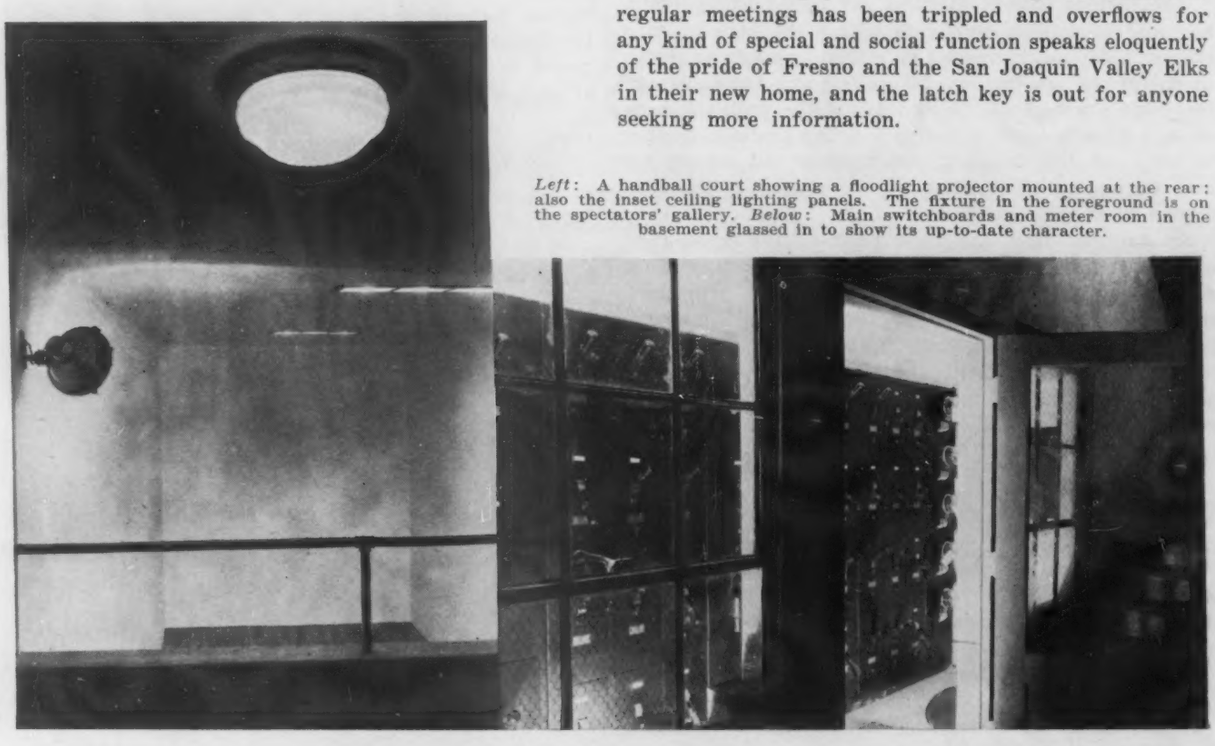
From the switchboard room a subfeeder system of adequate capacity rises to the various distributing panels and to a position on the present roof ready for future additional stories, even now designed in their major appointments. The sixth story will be a Venetian roof garden, with a glass enclosed ball room and night club, treated in ultra modern style.

Floodlighting Self-Contained

A self-contained floodlighting equipment for the entire six-story facade is provided for and executed in part on the present structure. The terra cotta spandrel of the second and third floors has installed in it suitable waterproof copper housing containing three reflectors each, with color lense equipment and a two-circuit control. A special reflector is installed to spot the Elk's head, independent of the rest of the floodlighting, even as another projector installed in the Elk's head is going to illuminate a flag whose pole will project over the sidewalk from the future fourth-floor spandrel. Only the terra cotta portion of the facade will receive floodlighting in order to accentuate only certain portions of the building.

A great portion of the electrification was incorporated in a most complete heating, cooling and ventilating system, as well as elevator and kitchen power and heat requirements.

Has it paid? Does proper illumination and electrification ever fail to pay? That the average attendance at regular meetings has been trippled and overflows for any kind of special and social function speaks eloquently of the pride of Fresno and the San Joaquin Valley Elks in their new home, and the latch key is out for anyone seeking more information.



Left: A handball court showing a floodlight projector mounted at the rear; also the inset ceiling lighting panels. The fixture in the foreground is on the spectators' gallery. *Below*: Main switchboards and meter room in the basement glassed in to show its up-to-date character.

Three-Phase Four-Wire System

CUTS WIRING COST

in Apartment House and Hotel Range and Air Heater Installations

By C. F. DAVEY
Electrical Division, City of Los Angeles.

WIRING costs, it has been contended, present a hurdle over which it is hard to take the sale of ranges and air heating. If this is true, then there is hope for a drastic reduction in the height of this hurdle, particularly as applied to apartment house and hotel installations. This hope lies in a more extensive employment of the four-wire three-phase system of distribution.

All during the period preceding today's demands for electric energy a single-phase system has been sufficient for most needs, particularly in residential districts. Three-phase four-wire systems, where used at all, have been employed in loft type buildings where combined power and lighting demands have required a maximum of service from a minimum of wiring. This was especially true in old buildings requiring extensive rewiring to serve combined loads. (See ELECTRICAL WEST, Sept. 1, 1928, p. 152.)

But to serve the residential load the idea of three-phase four-wire distribution has been ignored or sidetracked. Perhaps this has been due to the reluctance of the utility company to extend three-phase distribution where single-phase presumably would do. With the extensive building of large apartment houses, however, using power for elevators and other mechanical equipment, it is inevitable that the three-phase distribution network must be extended.

When it is extended sufficiently to be offered to apartment house builders generally, then one obstacle to the complete electrification of such buildings will be reduced considerably.

Savings in wiring costs due to the use of the three-phase four-wire system of distribution will amount to from 33 to 45 per cent over the 110/220-volt, three-wire system. These savings will be realized in wire size and conduit requirements, switch sizes and installation labor costs. One example which will be cited herein shows the net saving of over $350 on riser pipe, wire and labor alone in a 49-range, 60-air heater installation.

The only changes necessary to make possible the use of this system in the range itself are a rearrangement of connections of the elements and load balancing switching. California State Safety Orders would also tend to require certain safe-guards as to closed tops or otherwise protected range elements.

It will be well to consider some of the elements and consequences of such a system.

The metering depends on a special 220-volt, three-phase, horizontal-type meter. An additional coil is required in it to register the unbalance on the 110/220-volt load. Yet since large apartment loads usually require current coils, the cost of this special meter is of minor importance to the utility serving the load.

Accompanying this article is presented an economy study in transformer costs made by one of the utilities in Los Angeles. It was desired to know what effect it would have on the equipment required of the utility. This study tends to show a material saving effected for the utility by this type of installation. This study (table A) is based on the assumption that there would be some three-phase motor load in the building.

On a range manufacturer falls a small additional cost. This additional cost consists of the installation of a five-wire bus within the range. Where the ranges would all be used on a four-wire system this should not be serious as the complete order of ranges for an apartment house could be wired by the manufacturer to conform with the diagram shown in Fig. 1. This is a four-wire bus diagram and would be all that would be required of a range which was to be used for this type of installation only.

TABLE A

Economy Study of Transformer Installation Costs to Serve Apartment House Load

Made by A. L. WILLIAMS, Bureau of Power and Light, Los Angeles

SUMMARY

Apt. House†	Connected Load				Annual Cost*	
	Light	Range	Heat	Power	Single-phase	Three-phase
A	35 kw.	84 kw.	0	10½ hp.	$74.10	$73.62
A_1	35 kw.	84 kw.	24 kw.	10½ hp.	83.02	73.62
A_2	35 kw.	84 kw.	96 kw.	10½ hp.	99.55	105.35
B	120 kw.	360 kw.	0	20 hp.	166.28	159.09
B_1	120 kw.	360 kw.	60 kw.	20 hp.	166.28	159.09
B_2	120 kw.	360 kw.	240 kw.	20 hp.	196.08	186.26

† Representing six different loadings, three each on two different apartment houses.
* Representing transformer installation costs based on 8¼ per cent of total as annual cost, also core losses at $0.01 per kw.-hr.

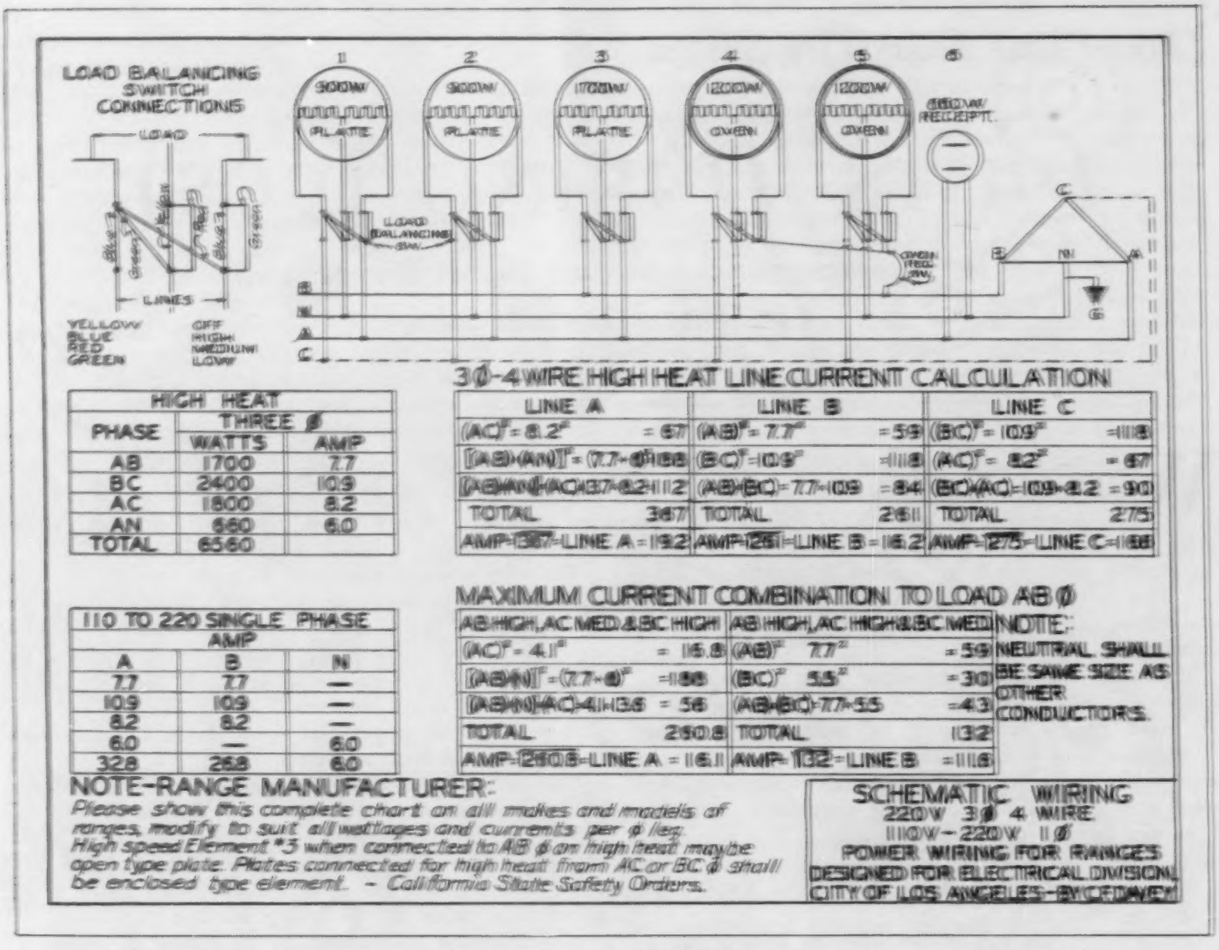

LOAD BALANCING SWITCH CONNECTIONS
LOAD
LINES
YELLOW BLUE RED GREEN
OFF HIGH MEDIUM LOW
1 2 3 4 5 6
900W PLATTE
900W PLATTE
1700W PLATTE
1200W OVEN
1200W OVEN
660W RECEPT.
LOAD BALANCING SW.
OVEN REG. SW.
B N A C G
3Ø-4WIRE HIGH HEAT LINE CURRENT CALCULATION
LINE A
(AC)² = 8.2² = 67
[(AB)+(AN)]² = (7.7-Ø)² = 59
[(AB)+(AN)]+(AC) 67+8.2 = 112
TOTAL 367
AMP=367÷LINE A = 19.2
LINE B
(AB)² = 7.7² = 59
(BC)² = 10.9² = 118
(AB)+(BC) = 7.7+10.9 = 84
TOTAL 261
AMP=261÷LINE B = 16.2
LINE C
(BC)² = 10.9² = 118
(AC)² = 8.2² = 67
(BC)+(AC) = 10.9+8.2 = 90
TOTAL 275
AMP=275÷LINE C = 14.8
MAXIMUM CURRENT COMBINATION TO LOAD AB Ø
AB HIGH, AC MED & BC HIGH
(AC)² = 4.1² = 16.8
[(AB)+(N)]² = (7.7-Ø)² = 59
[(AB)+(N)]+(AC) 41+16.8 = 58
TOTAL 260.8
AMP=260.8÷LINE A = 16.1
AB HIGH, AC HIGH & BC MED
(AB)² 7.7² = 59
(BC)² 5.5² = 30
(AB)+(BC) = 7.7+5.5 = 43
TOTAL 132
AMP=132÷LINE B = 11.6
NOTE:
NEUTRAL SHALL BE SAME SIZE AS OTHER CONDUCTORS.
HIGH HEAT
PHASE | THREE Ø WATTS | AMP
AB | 1700 | 7.7
BC | 2400 | 10.9
AC | 1800 | 8.2
AN | 660 | 6.0
TOTAL | 6560 |
110 TO 220 SINGLE PHASE
AMP
A | B | N
7.7 | 7.7 | —
10.9 | 10.9 | —
8.2 | 8.2 | —
6.0 | — | 6.0
32.8 | 26.8 | 6.0
NOTE-RANGE MANUFACTURER:
Please show this complete chart on all makes and models of ranges, modify to suit all wattages and currents per Ø leg. High speed Element #3 when connected to AB Ø on high heat maybe open type plate. Plates connected for high heat from AC or BC Ø shall be enclosed type element. - California State Safety Orders.
SCHEMATIC WIRING
220V 3Ø 4 WIRE
110V-220V 1Ø
POWER WIRING FOR RANGES
DESIGNED FOR ELECTRICAL DIVISION, CITY OF LOS ANGELES-BY C.F.DAVEY

Fig. 1. Wiring diagram for range and switches for use on 3-phase 4-wire system; also current demand tables.

If the manufacturer wished to make the range wiring universal so that the range might be adapted either to the three-phase four-wire system or to the ordinary single-phase system, it would be wired according to the diagram shown in Fig. 2. In this it will be seen that by installing a fifth bus and picking up one-half the load connected to C phase by means of two links as shown, a tie could be made between one C bus to phase B and one C bus to phase A. This would make it a 110/220-volt range as wired at present.

Any additional costs of such wiring would be compensated for by the omission of fuses to each element. These fuses could be omitted based on the 300-per-cent carrying capacity called for by the California State Safety Orders. The ranges, according to the Safety Orders, should be equipped with an enclosed-type element. The oven elements, however, could be open-type units when guarded by a baffle. Likewise the high-speed unit when connected to AB phase would be an open-type unit.

There is much to be said for the enclosed type of element from a sanitary standpoint. Most manufacturers give an optional choice of open- or closed-type elements at no additional cost. Moreover, the new high-speed elements being brought out are nearly all of an enclosed or at least protected type.

From the electrical contractor's standpoint this system is interesting in many ways. In the first place it permits material reduction in wire, conduit and switch sizes.

It is obvious that wire sizes can be reduced because of the difference in characteristics of the three-phase as against the single-phase 110/220-volt system. Fig. 1, in which are analyzed the loadings on each wire, illustrates this point to best advantage. It will be seen in the diagram that for the 110/220-volt single-phase system the current carrying capacity required is that to handle 32.8 amp. This calls for No. 8 wire. On the three-phase four-wire system, however, the maximum line current is 19.2 amp., requiring four No. 12 wires.

Obviously, range elements while operating on high heat require the largest size wire. Therefore, the entire system may be regarded as a three-phase system, plus

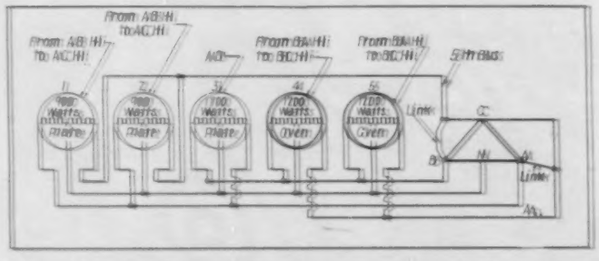


Fig. 2. Diagram showing connections by means of links and fifth bus by which range might be cut over from 3-phase 4-wire to single-phase 3-wire operation.

one additional wire for a neutral, the size of which may be 50 per cent of the largest wire for feeders and subfeeders with 100 per cent neutral for circuits. Tests in the near future will determine whether or not this 50 per cent is correct, but theoretically it should prove the case.

In actual installations when connected 110-220 volt single phase, it has been found that the actual connected wattage per phase leg has a tendency to unbalance the feeder supplying a group of ranges, whereas in the three phase four wire each range affords as near an ideal balance as can be expected with the present wattage including all ovens and plates.

The utility operating this system has as near a perfect balance as can be expected with the present wattages per unit as ranges are now manufactured. These wattages could eventually be modified slightly to give better balance and deliver the maximum B.t.u. to the consumer for the wire required. This is true, however, not only on a three-phase, but on the single-phase operation also. If manufacturers are considering any changes in design of ranges now or in the future the contractor, the utility and the owner could profit to a large degree if range sizes were determined by the carrying capacity of wires, rather than arbitrarily, as seems to be the case at present. Thus a range of 25-amp. capacity could be fed by No. 10 wire and full advantage be taken of the B.t.u. output with no excess in the number of circular mils required.

Air Heaters

With the four-wire system the built-in type of air space-heater can be used in combinations not obtainable in straight three-phase heating. It permits two 110-volt elements to be grouped in series on high heat on 220 volts connected to A and C phase, A and B phase, or C and B phase, or on medium and low heats as required by using the neutral and A phase or the neutral and B phase (C phase being designated as the power leg or 187 volts to ground).

Under this system it is possible also to connect a pilot or bullseye on the outside or over the door of an apartment, at the apartment house entrance or near the control switch, permitting the use of a standard small-base receptacle and 110-volt lamp, this bullseye being connected to A phase N or B phase N at any heater. This is possible because phase A or B appears at any heater if connected to a single-phase 220-volt supply of a three-phase four-wire system.

In so called single or bachelor apartments another form of bullseye or pilot installation is that of installing a master pilotboard in the manager's office. This would indicate which heaters were on in any part of the building. In this particular case a simple wiring method can be employed because in an apartment of this size as a rule not over two air space-heaters are required and both may be on one phase of the 220-volt, three-phase, four-wire system, permitting one return for two heaters to one bullseye pilot on the master pilotboard.

Such a system of pilot lighting can be used to check when tenants leave whether or not the heaters have been left on.

Further simplification would be possible for ranges and space-heaters if a color code of wiring were used. There is a general tendency to require some color other than black for the other ungrounded conductor in a three-wire 110/220-volt lighting circuit. In the three-phase, four-wire system, it has been required to use a red wire or one painted red at terminals, as the C phase (187 volts to ground) or power leg of the system, and a white neutral, one black wire and one of some other color such as green or blue for the 150-volt-to-ground legs. These multi-color code wires are now obtainable.

At the present time where an ordinary single-phase 220-volt system fed from a three-phase riser is in use it is possible and it often happens that a number of ranges are placed on a single side of the riser circuit and very often all of these are thrown on at the same time, causing a serious unbalance to the line. This may occur on a single-phase 220-volt riser connected to three phase.

But on the four-wire three-phase system each range balances its own load by virtue of the internal wiring of the range itself, which maintains as near a perfect balance as can be obtained at all times. The Fig. 1 diagram indicates this clearly. At the most the total unbalance would not exceed 3 amp. on the high heat, which could be compensated for by the transposition of A and B phase on the range on the next floor or in the next apartment. Where this is done it will be possible also to balance the maximum current combination to load A and B phases.

Another refinement for better load balance would be the use of a switch with a neutral terminal block located between A and B phases. The ordinary three-blade switch should be labeled or colored to identify the C, B, and A phases, respectively.

Although the utilities are not yet ready to commit themselves on the matter of this type of servicing, both utilities in Los Angeles at present have agreed to serve apartments and hotels with this four-wire system and metering arrangement when the following conditions obtain:

1. When a master meter only is to be installed and when some three-phase load is required in the building, such as for elevators, pumps, refrigeration, etc.

2. When there are at least eight ranges and 3 hp. of three-phase, 220-volt motor load and/or a connected load of 200 amp., three-phase, 220 volt. (This loading will require current transformers to accommodate this metering arrangement.)

Wiring Cost Analysis on Risers and Feeders

In a recent installation in a large apartment house where 49 electric ranges and 60 air heaters were installed the following comparison of costs was made:

Requirements

40 ranges of	4,700	watts each
8 ranges of	5,360	watts each
1 range of	8,460	watts

49 ranges of 239,340 watts total.

60 heaters of 1,000 watts each (220-volt, single-phase)—a total of 60,000 watts.

Total wattage, ranges and air heaters	299,340 watts
at 50 per cent demand	.05
Total demand	149,670 watts

On the 3-Phase 4-Wire System

$$\frac{149{,}670 \text{ watts}}{220 \text{ volts}} = 680 \text{ amp.} \qquad \frac{680 \text{ amp.}}{1.73} = 393 \text{ amp.}$$

393 amp. calls for 3 500,000-circ.mil wires or a total of 1,500,000 circ.mils, giving a wire area of	3.00
Neutral of one No. 2/0 wire of 133,100 circ.mils wire area	.36
Required conduit size	3 in.

On the Single-Phase 110/220-Volt System

$$\frac{149{,}670 \text{ watts}}{220 \text{ volts}} = 680 \text{ amp. calls for wire of}$$

1,100,000 circ.mils × 3 = 3,300,000 circ.mils. Wire area 6.12
Required conduit size ..... 4 in.
(3,300,000 circ.mils — 1,633,100 circ.mils = 1,666,900 circ.-mils saved.)

Conduit Savings

3-in. conduit—$ 67.50 per 100 ft., or $ .67 per ft.
4-in. conduit—$108.00 per 100 ft., or $1.08 per ft.

Saved per ft. ..... $ .41
Total saving this job on risers alone, $52.20.

Wire Savings

Single-phase system: 420 ft. of 1,000,000-circ.mil*	$495.69
Three-phase 4-wire: 420 ft. of 500,000-circ.mil	207.14
140 ft. of No. 2/0	23.35
Total	$230.49
Total saving on feeders alone	$265.20

* Data on 1,100,000-circ.mil wire as required not available as it must be made up on order. Therefore figures of 1,000,000-circ.mil were used for the purposes of this calculation.

Labor Saved

Using the Electragist system of unit labor cost data, the cost of installation of riser conduit and for pulling feeders on

single-phase system is	$158.00
Three-phase 4-wire system is	108.00
Net saving on labor	$ 50.00

Total Saving on Risers

On conduit of smaller size	$ 52.20
On smaller wire sizes	265.20
On installing labor	50.00
Total saved	$367.40

SAVINGS IN WIRING

So much for the theory of this type of servicing. An actual example of the saving in wiring costs is presented in the following table.

The total net saving on risers and feeders alone, therefore would be $265.20 on wire, $52.20 on conduit and $50 on labor, a total of $367.40. No consideration has been given in the foregoing table to the savings possible on switches, either for the circuits or for main-line switching. Likewise circuit wiring aind conduit savings would be considerable. For instance, four No. 14 wires could be pulled instead of three No. 10's and the conduit size could be ½-in. as against ¾-in. throughout the building.

Where cost of wiring is set up as an obstacle to the installation of electric ranges and air heaters in competition with gas equipment, such a reduction in the wiring costs cannot help but prove a boon to the salesmen for the electrical idea. Such savings are actually being made in recent apartment installations in Los Angeles where the idea is being given a thorough test.

Relative Advantages of Curtained and Curtainless Electric Brooders

By J. E. DOUGHERTY

Associate Professor of Poultry Husbandry, College of Agriculture, University of California, Davis.

ELECTRICITY as a source of heat for brooding chicks has proved extremely popular with poultry keepers in California because of its convenience. Electric heating differs from other methods in two very important ways, first, the air is not vitiated by the combustion of fuel, and second, the heat can be turned off and on as frequently as is necessary to maintain any given temperature.

Since electric heating does not consume oxygen from the air but leaves it all for the chicks, one might suppose that its use for brooding would simplify the problem of obtaining adequate ventilation, and it should do so if properly applied. But in learning to use electric brooders poultrymen generally have tried to hold down the consumption of electric energy by restricting ventilation. This practice is frequently carried to the point where the flow of air through the brooder is insufficient to remove the moisture produced by the chicks rapidly enough to prevent condensation.

The air breathed in by each chick is warmed and brought into intimate contact with the moist mucous lining of the air passages while oxygen is being taken from it. Hence, when exhaled, it not only contains carbon dioxide but is heavily charged with water vapor. As ventilation of the brooder is curtailed this water vapor, together with the moisture excreted in the feces, apparently causes the humidity to rise toward the dew-point more rapidly than the oxygen content falls toward the danger point. Unless there is sufficient ventilation to remove this moisture the air of the brooder soon becomes saturated. Currents of saturated warm air circulating from the center of the hover downward and outward become cooled and can hold less water vapor. The surplus is deposited on the cooler surfaces near the floor. When this occurs the brooder is said to "sweat." The relative humidity, therefore, rather than content of either oxygen or carbon dioxide, would appear to be the real indicator of effective ventilation of an electric brooder.

The quantity of water vapor that air will hold is doubled with each 27 to 30 deg. F. rise in temperature and is halved with each 27 to 30 deg. F. fall in temperature. This fact has a very important bearing on the ventilation of an electric brooder in controlling ventilation and promoting dryness. For example, every cubic foot of air at a room temperature of 60 deg. F. which enters an electric brooder with an automatically maintained temperature of 90 deg. F. can absorb at least

as much more moisture at the hover temperature as it contained before it entered. If, as would usually be the case, the relative humidity of this air when it enters the brooder is considerably below 100 per cent, it can absorb even more than twice what it held before entering. Therefore every cubic foot of air entering the hover should absorb a certain amount of the moisture being produced by the chicks and every cubic foot of air leaving the hover should carry away a greater amount of moisture than it brought in. Increasing the number of cubic feet of air moving through the brooder per minute should speed up the removal of moisture, whereas decreasing the air movement should slow it down. The rate of movement of the air through an electric brooder evidently influences the removal of moisture and the degree of dryness that is maintained under the hover.

The chief motive force in natural ventilation is heat. Heat produces temperature differences in air that set it in more or less rapid motion depending upon the range of temperature involved. Brooders use the natural system of ventilation. The inflow of fresh air and outflow of stale air are brought about by differences in temperature between the air in the brooder and that in the brooder room. The rate of air flow, however, depends not only on such temperature differences but also on the size and location of the ventilation openings.

When warmed air leaves the hover, the electric heating elements must warm the fresh air that enters to replace it and the more rapid this circulation of air through the brooder, the more rapidly is heat absorbed and removed. Electricity to produce heat costs the poultryman money. It is not free like air. Hence a flow of air through an electric brooder which, due to too large openings for ventilation, is in excess of what is needed to remove the moisture produced by the chicks and keep the hover dry, causes a needless waste of electric energy.

In a consideration of curtainless brooders which, as a rule, use radiant heat, and curtained brooders using black heat, a number of important problems are involved. These are (1) the effect of radiant heat on the comfort of the chicks as compared with black heat, (2) ventilation control, (3) heating capacity, and (4) cost of operation.

The radiant heat produced by glowing elements is not necessarily superior to the non-radiant heat from heating elements that do not glow in keeping an electric brooder dry. Neither are red hot stoves more desirable than a hot air furnace in heating a dwelling. Radiant heating units, unless properly designed and installed, may cause the center of the hover to become so hot that the chicks cannot remain there. Such a condition not only reduces the warm area under the brooder that the chicks can safely use but may cause injurious crowding.

As previously pointed out, the air flowing through an electric brooder not only removes moisture but also carries away heat. Further, the amount of air moving in and out per minute depends both on differences in temperature between the air inside and outside of the brooder and on the size and location of the ventilation openings. Therefore the air flow through a brooder set at 90 deg. F. should be greater at a room temperature of 50 deg. F. than it would be at a room temperature of 80 deg. F., if the ventilation openings remain the same. It should likewise be increased by enlarging the ventilation openings without any change in room temperature.

Electric brooders must be operated under a wide range of conditions including cold as well as warm weather and wet as well as dry weather. Therefore it would seem, from what has been said, that an effective method of controlling ventilation is desirable. For this purpose the curtain used on brooders of the black heat type offers a simple and very practical means of regulating the size of opening through which air can pass in and out by changing the height of the curtain above the floor. It is true that the curtain does away with that characteristic of "foolproofness" of ventilation possessed by the curtainless brooder. The curtain must be raised or lowered to meet weather conditions and the age of the chicks. But it does offer a very inexpensive and effective way of regulating ventilation to keep the hover dry without excessive waste of heat.

Sufficient heating capacity to keep day-old chicks comfortable in the coldest weather that may occur while brooding is a third requirement of an electric brooder. If air flows through the brooder too rapidly, it may remove heat faster than the electric heating units can generate it and the desired temperature under the hover cannot be maintained. If the heating units are large enough to prevent a fall in temperature, but the rate of flow of air (which tends to increase as the room temperature drops more and more below that of the brooder), is greatly in excess of what is required to keep the brooder dry, an excessive amount of electric energy must be consumed.

A curtainless brooder is most apt to suffer from overventilation and undue heat loss in cold weather because of the large amount of ventilation opening provided even when this is reduced as much as possible. Two and one-half to three inches from the floor is as low as the edge of the curtainless brooder can be placed, whereas a curtain can be lowered close to the floor without interfering with the movement of the chicks in and out.

From the standpoint of operating cost the curtainless brooder provides abundant ventilation without the necessity of much, if any, manual adjustment up and down from time to time. The curtained brooder, on the other hand, will permit equally as good ventilation as the curtainless type if the bottom of the curtain is kept high enough. It can also be lowered to further restrict air circulation through the brooder in cool weather and thus conserve electric energy without impairing effective ventilation. The greater flexibility of control provided by the curtain enables the poultry keeper to adjust ventilation better to prevent a waste of heat and to reduce the consumption of electricity during the colder part of the brooding season when the lack of a curtain might permit more of a circulation of air through the brooder than required.

Well designed brooders of either type should give equally good results, in so far as quality of chicks reared is concerned. On this basis the problem presented by the use or non-use of a curtain is more economic than biologic. It involves cost of rearing rather than vigor of growth. A flexible control of ventilation demanding intelligent operation to obtain results is compared to a fixed minimum ventilation that guards the chicks against mistakes of the inexperienced operator but may increase fuel costs.

Electrical West

C. T. HUTCHINSON, *Editorial Director*
G. C. TENNEY, *Managing Editor*

Hail, Thomas Alva Edison!

TO YOU, on this fiftieth anniversary of the invention of the incandescent lamp, the electrical industry looks with reverence, gratitude, pride, respect and affection. Your name will be written high among the immortals, for you are the personification of service for the benefit of humanity.

Armed with courage, vision, imagination and the spirt of human kindness instead of the sword, you have fought darkness with light and have won a great victory. Not only have you dispelled darkness, but your genius has lifted an oppressive burden from the shoulders of mankind.

Having witnessed the fruits of fifty years of your labor you have given to the electrical industry this challenge, "The record is wonderful, but fine as it is, it can be made still better and I have a feeling that in your hands it will be."

The industry accepts this challenge. The industry pledges to you to carry forward with new zeal the high standards you have set—to spread from the marketplace to the remotest home the great gifts that you have provided to increase the sum of human happiness.

David L. Huntington— In Memoriam

CLOSING a term of thirty-five years of service to the light and power industry of the Pacific Northwest, David L. Huntington, president of the Washington Water Power Company, has gone on. His was truly an electrical career. From college graduation to his last day his heart and soul were wrapped up in the electrical industry.

Efficient service was his watchword, and the great hydro-electric property he built up in Washington and Idaho is mute testimony of his ability. His passing leaves another gap in the ranks of the few remaining pioneer electrical builders. He, like them, leaves a great monument to his memory, a company that is a most important link in the Pacific Coast network.

No Belligerents, No Fight

BY refusing to take up the gauntlet thrown down by government ownership advocates in the state of Washington, the electric light and power companies have created a political stir in the Pacific Northwest. In a frank statement A. W. Leonard, president of the Puget Sound Power & Light Company, has declared that the power companies absolutely refuse to engage in an organized fight against the District Power Bill. The attitude of the power industry, as Mr. Leonard sets it forth, follows:

"The power industry in this state is tired of bearing the brunt of continued political assault. It is tired of serving as a bumper to protect all other industries and businesses and the taxpayers generally from the attacks of those who are advocating public ownership of everything, regardless of costs and consequences. . . . We do not intend to let the politicians pose the industry as an object of public hostility. . . . So far as the industry is concerned it doesn't stand to lose much except the privilege of paying heavy taxes on a vast amount of property, maintaining great payrolls, spending huge sums for labor and materials, and otherwise contributing to the prosperity of the state. If the properties of our own company should be taken, for example, we will receive full compensation for them whether purchased or condemned. . . . If the people want to wipe all this out (referring to investment and tax returns of the utilities) they must reckon on paying the bill. . . ."

It is almost axiomatic that where there are not two or more belligerents there can hardly be a fight. Instead of being placed on the defensive by picking up the public ownership gauntlet and thus playing into the hands of the enemy, the power companies intend to stand aloof. Rather than be embarrassed themselves, they have embarrassed their opponents.

Where there is no fight there can be no invectives, no vituperation, no calling of names. And without these where are the arguments of the political ownership proponents?

By leaving the decision in the hands of the taxpaying voters it would appear that the power companies have taken a wise step. The voter will have no one to do his thinking for him. He will not be befuddled with misstatements, immaterial arguments or flights of oratory. Thinking for himself, his voting should be dictated by sound common sense. And sound common sense in voting should hand to the municipal ownership advocates a defeat from which they will never recover.

Conventions Brought Home to Be Put to Work

THOSE features of a convention which have transformed it from a debating society to an industry exposition are doing something to the credit of the convention which is decidedly worth while. Particularly has this been true of the last P.C.E.A. convention. Those who attended it were not satisfied to have enjoyed it by themselves. They have brought it home to their less fortunate fellow workers so that they may gain from the convention as the delegates did.

The plays and films presented at the recent convention have been re-enacted and projected in more individual companies than has ever been the case before. Requests for copies of the manuscripts of papers and of the scripts of plays have been continuous. The films shown at the convention have enjoyed wide booking. In this way some of the value of the convention has been brought home to benefit the entire company instead of only those few delegates who attended the sessions.

This is certainly as it should be. In fact, future conventions well might be designed more with this object in mind. If every feature of a convention could be planned in such a way that it could be taken bodily to each member company later for presentation to all employees, the investment in a convention could be realized almost in full.

The mediums for this sort of program are at hand. The playlet is easily reproduced in any company. The moving picture likewise. And now, with the talking moving picture, even the prominent personalities who address a convention may be brought to speak to all the employees of a company after having been previewed at the annual convention.

Yesterday only a few selected persons could hope to attend and profit from a convention program. Tomorrow the convention will be brought to the company instead.

A State License for Contractors

DEBATED and sought after in various forms for many years, the actual fact of state licensing of all contractors has arrived in California. The vehicle which has brought licensing is a bill which appears to have teeth in it.

Naturally the bill is designed to protect the property owner from the fly-by-night contractor of whatever craft. Yet, in accomplishing this objective, it is inevitable that it will prove a strong protection to the legitimate contractor who has suffered the destructive competition and the damaged public confidence which the unscrupulous contractor has engendered.

By the provisions of this act, on pain of severe penalties, not only is the contractor required to secure a license to operate, but he is charged indirectly with full responsibility for his acts. Failure to perform a satisfactory job, which includes abandonment of contract, diversion of funds, departure from plans and specifications or violations of codes or labor laws, subjects the contractor to possible prosecution and fine and imprisonment.

Law of itself will not effect a cure. It does provide the means for cure, a foundation for action and a basis from which to start to improve an intolerable situation. Human nature being what it is, there will still be violations of contract agreements. In the past there has been no means of bringing to task the perpetrators of crimes against the building public. This new bill, if it provides nothing else, does open the courts to punish the unethical contractor for practices for which he has not stood in danger in the past.

ONE cannot help commending the courage of the gas people in San Diego. They conducted their three-minute speaking contest before the Electric Club of that city on the subject, "Gas Is Better." Likewise commendable is the assurance of superiority of the electric people in letting them do it.

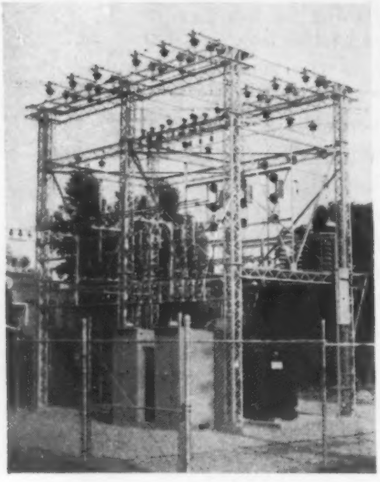
Engineering Practice

Service of Small Rural Substation Improved With Automatic Reclosing Equipment

By FRANCIS H. CURTIS, Engineering Department, The Southern Sierras Power Company, Riverside, California.

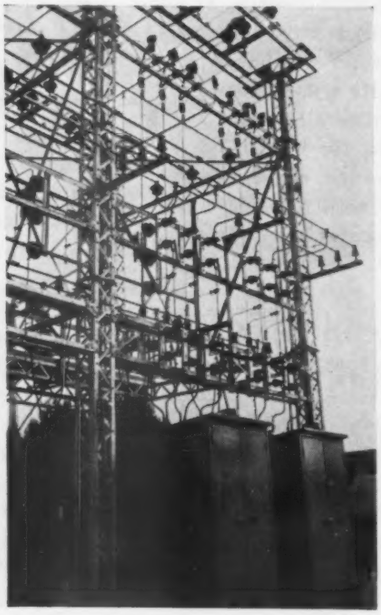
AUTOMATIC reclosing oil circuit breakers on the distribution circuits from the Somerton substation of the Yuma Utilities Company (a subsidiary of The Southern Sierras Power Company) have improved materially the service continuity in the area served by that substation. The substation is situated approximately ten miles from Yuma, Ariz., and serves a combined agricultural and industrial load including pumping, miscellaneous agricultural power and some cotton-ginning mills.

These automatic breakers are placed on the outgoing 4-kv. circuits of which there are two at present with provisions for the addition of two more as load may demand. All of the related equipment together with the breaker itself is mounted in small sheet-steel switch houses which may be discerned in the accompanying illustrations. To increase the operating flexibility of the station, both a service and a transfer 4-kv. bus are installed, permitting necessary inspection of and repairs to equipment without circuit interruption.



A general view of the 1,000-kw. all-outdoor 33/4-kv. Somerton substation of the Yuma Utilities Company. The safety door on the ladder leading to the 33-kv. fuse platform may be noted at the right just above the fence line.

The company's operating records show conclusively that most interruptions which will cause circuit breaker operation are of a momentary nature and that after the circuit breaker has been reclosed normal service will continue. Therefore the breakers as installed are equipped with a lockout device which permits three successive reclosures within a given period of time after which the circuit breaker is locked in the open position until the mechanism is released by an attendant. It so happens that the nearest attendant for this particular station is some distance away and thus the reclosing breakers have at once improved the service, promoted better public relations and eliminated the necessity of an attendant at the station.



Four-kv. construction at Somerton substation of the Yuma Utilities Company, showing also sheet-steel circuit breaker cabinets.

Somerton substation is fed by two 33-kv. lines serving its 1,000-kva. transformer bank. Protection as installed consists of tetrachloride fuses (on the 33-kv. side) together with an autovalve lightning arrester on the high-tension bus. As a safety feature protecting the attendant or maintenance man, a "ladder door" is inter-connected with the 33-kv. air-break transformer switch control mechanism in such a manner that the attendant cannot climb to the 33-kv. platform while the switch is closed. This particular feature was described in detail on page 219 of Electrical West for Oct. 1, 1928.

Turbine Shaft Straightened With Acetylene Flame

A distorted turbine shaft on a 1,500-kw. steam-electric generating unit in the old plant of the Southern Colorado Power Company at Pueblo recently was straightened by means of an oxy-acetylene torch. The unit has been serving for some time as a standby utilizing steam from a new plant. This steam is delivered to the old plant at 225-lb. pressure, 150-deg. superheat, whereas the unit in question was designed to operate on 150-lb. saturated steam. The pressure differential was corrected by means of a reducing valve but the steam proved to be too hot and caused the distortion of 0.050 in. in the 15-in. turbine shaft.

The straightening was done entirely with heat from an oxyacetylene welding torch, no pressure being applied at any time. To straighten the shaft, heat was applied to the high sports, thereby causing the metal to expand, producing still more distortion while hot. However, upon cooling the molecules of the metal arrange themselves without strain and with the proper amount of heat applied the return deflection of the shaft as it cools will overcome the original deflection, resulting in straightening.

An instrument known as a dial indicator, giving a reading in thousandths of an inch was used to indicate the extent of spindle distortion. Several trials with the oxyacetylene torch were made before the desired result was obtained, as follows:

First trial: Shaft heated to cause distortion of 0.020 in. more than when cold. No change in original distortion resulted when the shaft cooled.

Second trial: Shaft heated to a hot deflection of 0.040 in. Again with no change upon cooling.

Third trial: Shaft heated to cause a hot deflection of 0.080 in. resulting in a correcting deflection when cooled of 0.013 in., reducing the initial 0.050-in. distortion to 0.037 in.

Fourth trial: Heat applied to cause 0.100-in. hot deflection. When the shaft cooled the maximum out-of-line distortion was reduced to 0.005 in., which was acceptable.

The machine was reassembled, given a balance test run and then replaced in service. Its operation is reported as being "as good as new."

Fundamentals of Correct Metering—III

Blondel's Theorem as Applied to the Metering of a Five-Wire Circuit With a Mesh-Connected Load

By E. C. Goodale, Tacoma, Washington.

IN THE first two articles of this series a brief outline of Blondel's theorem was given and the way in which this theorem operates with respect to three- and four-wire metering problems was illustrated. More advanced applications follow.

In Fig. 5 is shown a five-wire interconnected system of any phase, any unbalance of voltages, and loads of any power factor or unbalance. According to Blondel's theorem four meters or meter elements are needed to meter the circuit. For the sake of clearness assume that the meters are connected as indicated and that "E" is the common conductor, hence having no meter in it.

Before assuming values of load it will be best to assume values of line voltages. In accordance with Kirchoff's law that the net rise and fall of potential around any closed circuit must equal zero, it is evident then that any values of line voltage may be chosen provided their vectors form a closed polygon when plotted in a heel-and-toe manner. The first four voltages could be assumed of any value and phase desired, but the fifth would have to be of such value and phase as to close the vector polygon.

As in Fig. 6A, E_1, E_2, E_3 and E_4 may be assumed as shown, but E_5 cannot be selected offhand as it must form the closing link to the polygon. It, as well as the others must be in such a direction as will agree with the connection diagram, Fig. 5.

Suppose, then, a set of line voltages of the values and phase relations shown in Fig. 6A occurs and that these are impressed across a set of mesh loads sending currents through these loads in the directions indicated in Fig. 5. Loads 1, 2, 3, 4, and 5 are connected from consecutive lines on the diagram and hence are fed by the voltages E_1, E_2, E_3, E_4, and E_5, forming the polygon of Fig. 6A. The remaining loads, 6, 7, 8, 9, and 10 are affected, however, by certain combinations of these voltages. These may be determined as in Fig. 6B by connecting the points on the vector polygon by straight lines. For example, E_6, which is the pressure between lines CC and AA (from CC to AA as assumed in Fig. 5) is found diagrammatically in Fig. 6B by drawing a straight line from CC to AA. This represents the numerical value and phase angle of voltage E_6. In accordance with the modification of Kirchoff's law that the voltage measured between any two points is the same regardless of route chosen, referring to Fig 5 it would seem that if progressing from CC to AA by way of CC BB AA the resulant voltage E_6 should equal $E_2 + E_1$, or if by way of CC DD EE AA it should equal $-E_3 - E_4 + E_5$. These assumed directions

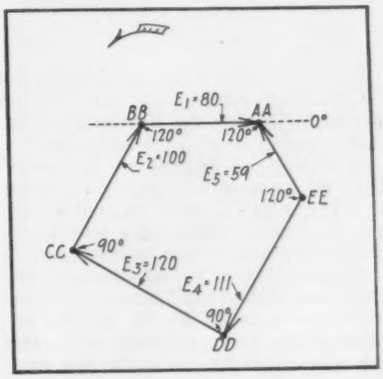


Fig 6A. Vector polygon diagram of line voltages involved in Fig. 5. Note that $-E_3 + E_4 + E_2 + E_1 + E_5 = 0$.

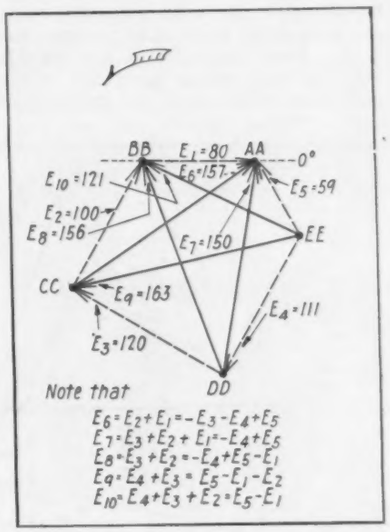


Fig. 6B. Vector polygon diagram showing derivation of unknown mesh voltages from the polygon of known voltages.

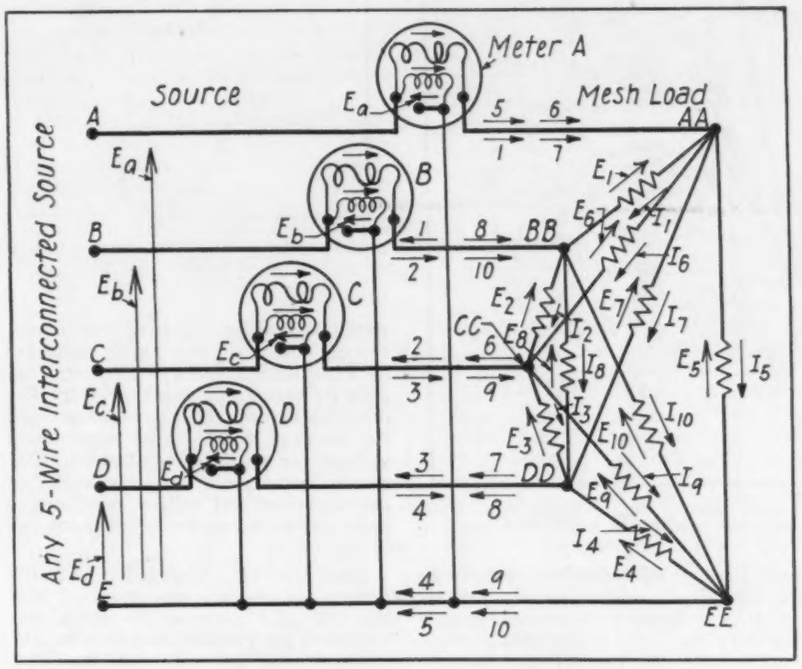


Fig. 5. A metering connection of any five-wire interconnected "mesh" system that will give correct registration regardless of voltage or load balance or load power factor.
Upper arrow in meters indicates direction of current flow for "positive" registration.
Center arrow in meters denotes direction of current flow exciting the potential coil.
Lower arrow in meters denotes direction of potential coil voltage drop.
Numbered arrows on lines show directions of load currents through meters.
Closed-headed arrows on loads show assumed directions of currents through loads.
Open-headed arrows on loads show assumed directions of load voltages (opposite to current arrows).
For example: Load 6 is affected by voltage E_6 which is vectorially equal to $-E_c + E_a$, and draws current I_6 forward through meter A, down through load 6 and backward through meter C, thus registering correctly.

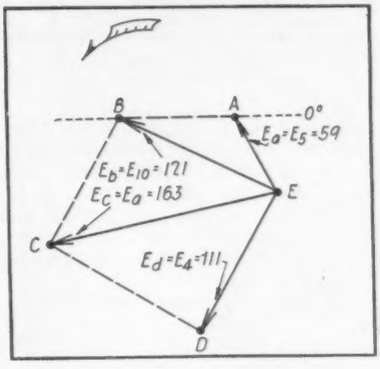


Fig. 6C. Vector diagram showing the voltages actually impressed on the meters of Fig. 5. Compare this with Fig. 6B.

TABLE I—Various values involved in accompanying explanatory example.

Current	Power Factor	Power Co. Component		Power Taken by	
I_1 = 1 amp. leads E_1 by 90 deg.	1.000	"I_1 to E_1" = 0.000 amp.	Load	1 = 80 × 0.000 =	0 watts
I_2 = 2 amp. leads E_2 by 70 deg.	0.342	"I_2 to E_2" = 0.684 amp.	Load	2 = 100 × 0.684 =	68 watts
I_3 = 3 amp. leads E_3 by 50 deg.	0.643	"I_3 to E_3" = 1.930 amp.	Load	3 = 120 × 1.930 =	232 watts
I_4 = 4 amp. leads E_4 by 30 deg.	0.866	"I_4 to E_4" = 3.464 amp.	Load	4 = 111 × 3.464 =	385 watts
I_5 = 5 amp. leads E_5 by 10 deg.	0.985	"I_5 to E_5" = 4.825 amp.	Load	5 = 59 × 4.925 =	290 watts
I_6 = 6 amp. lags E_6 by 10 deg.	0.985	"I_6 to E_6" = 5.910 amp.	Load	6 = 157 × 5.910 =	928 watts
I_7 = 7 amp. lags E_7 by 30 deg.	0.866	"I_7 to E_7" = 6.062 amp.	Load	7 = 150 × 6.062 =	909 watts
I_8 = 8 amp. lags E_8 by 50 deg.	0.643	"I_8 to E_8" = 5.143 amp.	Load	8 = 156 × 5.143 =	802 watts
I_9 = 9 amp. lags E_9 by 70 deg.	0.342	"I_9 to E_9" = 3.078 amp.	Load	9 = 163 × 3.078 =	502 watts
I_{10} = 10 amp. lags E_{10} by 90 deg.	1.000	"I_{10} to E_{10}" = 0.000 amp.	Load	10 = 121 × 0.000 =	0 watts
				Total Power =	4,116 watts

of voltage in Fig. 5 are indicated by the open-headed arrows, the head of the arrow indicating the conductor of assumed higher pressure in each case.

Referring to Fig. 6B it is evident that E_8 is vectorially equal to either $E_2 + E_1$ or $-E_9 - E_4 + E_5$ In similar ways the other mesh voltages are determined, their equivalent values being shown in the notes under Fig. 6B. Similarly the numerical values and phase positions of the voltages E_a, E_b, E_c, and E_d, applied to the meter potential coils, also are determined by connecting the common point E to the remaining points of the vector polygon as illustrated in Fig. 6C.

Now, having a set of line voltages which agree with Kirchoff's law and hence which represent a possible case, the next thing to do is to assume currents. Since line currents are dependent for their values upon the values and phase relations of the currents to general, assume that all loads are different and each is lagging or leading by a different angle.

In Table I are the values assumed for the purposes of this example.

In Fig. 7 are shown all the voltage vectors of the previous polygon diagrams, arranged with their "heels" together to show the phase angles between them. Each voltage is accompanied by its corresponding current plotted to scale and leading or lagging the corresponding voltage by the angles given in Table I.

In order to determine the true power taken by all the loads it is necessary to multiply the voltage impressed on each load by the power component of its current with respect to that voltage. Then the sum of the power taken by the individual loads will give the true totals. The power components are determined diagrammatically as in previous examples by dropping perpendiculars

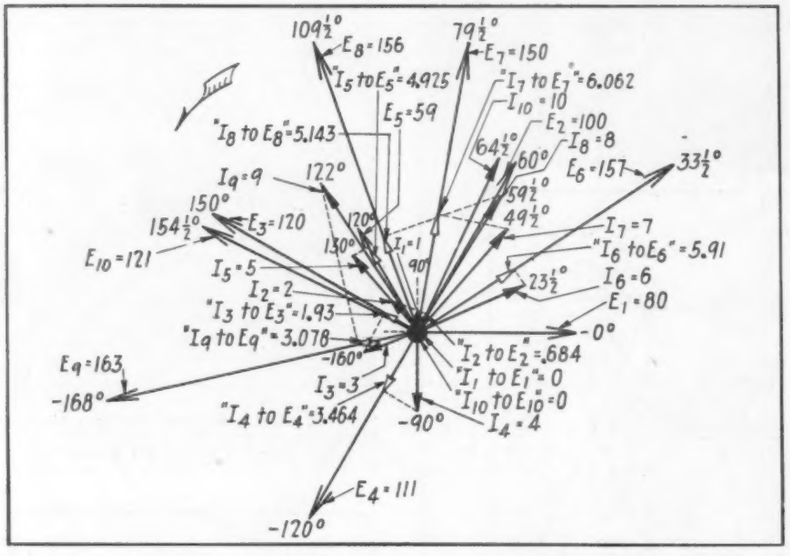


Fig. 7. Determination of the true power to the mesh loads of Fig. 5. Table I gives the numerical values involved. The total mesh load amounts to 4,116 watts.

the individual loads, and since these loads may be either mesh (connected directly across the line) or star (connected from the lines to some intermediate point or points) it will be best to assume values for the load currents, taking up the mesh connections first for the sake of clearness.

As long as the source is able to maintain the line voltages as assumed it is possible to assume any values of load currents desired and lagging or leading their impressed voltages by any angles. In order to make the example very from the tips of the current vectors to the line of the corresponding voltage vector, the distance from the common "heel" to the point where this perpendicular cuts the line of the voltage vector being to the same scale as the current, the power component of the current with respect to that voltage.

The true power taken by the loads then will be as shown in Table I.

See Fig. 7 for the values of the power components used in this table.

In Fig. 5 it may be noticed that there are three direction arrows inside each meter. The top one of these shows the direction of the current flow when it is positive. The middle one shows the direction of the voltage coil exciting current for a positive registration and the lower (open-headed) arrow shows the corresponding directions of the voltage drop across this voltage coil, always opposite to that in which the current flows through it. This does not mean that the voltages and currents actually flow in the indicated directions at the same time.

For example, if the current passing through the meter were in phase with the voltage, then at any instant of time at which the current flowed at a maximum from left to right the pressure increase would be from right to left also at a maximum, the tip of the arrow being at the point of the higher potential. The current actually flowing through the voltage coil, however,

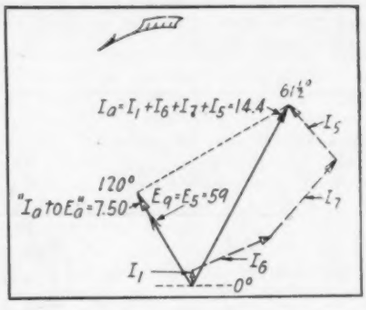


Fig. 8A. Power registered on meter A of Fig. 5. 59 × 7.50 = 443 watts.

would be practically zero at that instant for the coil itself is a highly inductive load and therefore draws a current lagging its voltage by nearly 90 deg. The direction arrows, then, merely represent the assumed directions of current and voltage for positive registration. The vector diagram shows by the angle between current and voltage whether the registration actually is forward or backward.

Since in the illustration all the meter's voltage coils are energized with the left side assumed at the higher potential, the positive direction for the currents will be from left to right. Hence any load which returns a current from right to left through a meter will have an "apparent" backward registration. Actually the registration might not be backward as would be the case if the current were more than 90 deg. out of phase with the voltage impressed on that particular meter. Under such a condition the reversal of the

vector of such a current would make it less than 90 deg. out and it would register forward.

For example, meter A's voltage will interact with $I_3 + I_6 + I_2 + I_1$, none being in the reversed direction, whereas meter B's voltage will interact with $-I_1 + I_8 + I_2 + I_{10}$, current I_1 passing through in a reverse direction, etc. The total power to the load could be determined by either:

(a) Multiplying the voltage impressed on each meter by the power component of each current flowing through it (reversing with the minus sign) and adding these bits of power together algebraically (i.e. with reference to plus and minus signs) to find the total which would be registered. Or
(b) These currents may be added vectorially first and the power component of their resultant multiplied by the meter's voltage.

It is purely a matter of choice which method is used. In order to illustrate

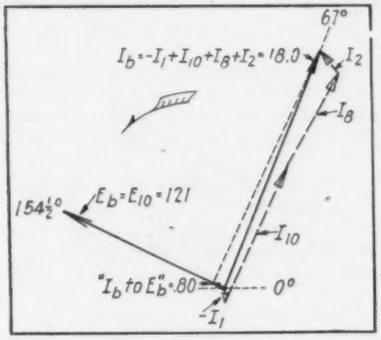


Fig. 8B. Power registered on meter B of Fig. 5. $121 \times 0.8 = 97$ watts.

it and also the way in which line currents are determined, the latter method will be used in the following discussion and illustrated in Fig. 8.

The line currents (total currents passing from the source to the load) are assumed to flow from the source to the load and hence agree with the "positive direction of flow through the meters. The current flowing from

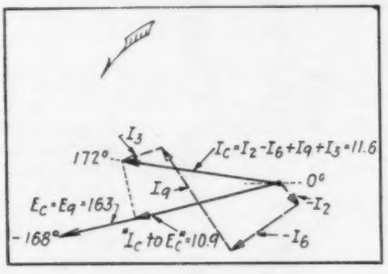


Fig. 8C. Power registered on meter C of Fig. 5 $163 \times 10.0 = 1,778$ watts.

source to load over line A is called I_a. It will be made up of $I_3 + I_6 + I_1 + I_7$ added vectorially. Fig. 8A shows the heel-and-toe method of vector addition, the resultant being $I_a = 14.4$ amp. at 61.5 deg. from the reference line and hence lagging by 58.5 deg. meter A's voltage E_a, which is 59 volts at 120 deg. The power component of I_a with respect to E_a then may be found, by scaling the diagram, to be equal to 7.5 amp. Hence the registered power is $59 \times 7.5 = 443$ watts on meter A.

In a similar manner Fig. 8B shows that the value of $I_b = 18$ amp. and its power component with respect to E_b is 0.8 amp. Hence the power registered by meter B is only 121×0.8 or 97 watts.

Meter C passes $I_c = 11.6$ amp. as illustrated in Fig. 8C and its power component with respect to E_c is 10.9 amp. This gives a registered power of 163×10.9 or 1,778 watts.

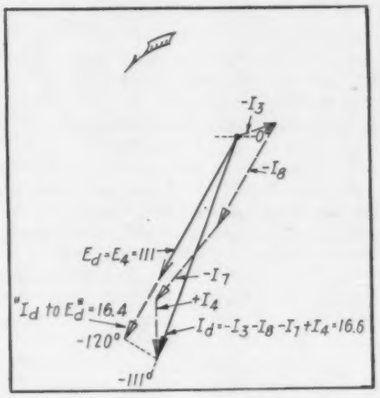


Fig. 8D. Power registered on meter D of Fig. 5 $111 \times 16.4 = 1,798$ watts.

In Fig. 8D is shown the derivation of meter D's operation. I_d is found to be 16.6 amp. and, projected to E_d, this gives a power component of 16.4 amp. The meter therefore shows a registration of 111×16.4 or 1,798 watts.

The total registration on the four meters, therefore, is $443 + 97 + 1,778 + 1,798$ which is 4,116 watts. This agrees with the calculations for the value of the true power to the load and indicates the correctness of Blondel's theorem for metering complicated mesh loads.

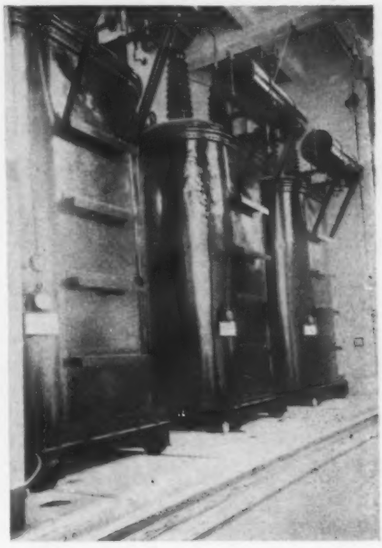
In closing this particular discussion it may be well to point out the application of Kichoff's current law or its modification to the junction points AA, BB, CC and DD in Fig. 5. This modification of the law states that a current entering a junction point is equal to the sum of all currents leaving, minus any other current entering. This would mean, then, that at point AA the current I_a entering AA must equal the sum of all currents leaving, which latter are found by tracing down through the loads to be I_1, I_8, I_7, and I_5. Hence I_a is equal to the vector sum of $I_1 + I_8 + I_7 + I_5$, as already has been taken for granted because of their indicated directions on the connection diagram, Fig. 5. In a similar way the other line currents could have been determined.

Star loads will be taken up in the next article of this series.

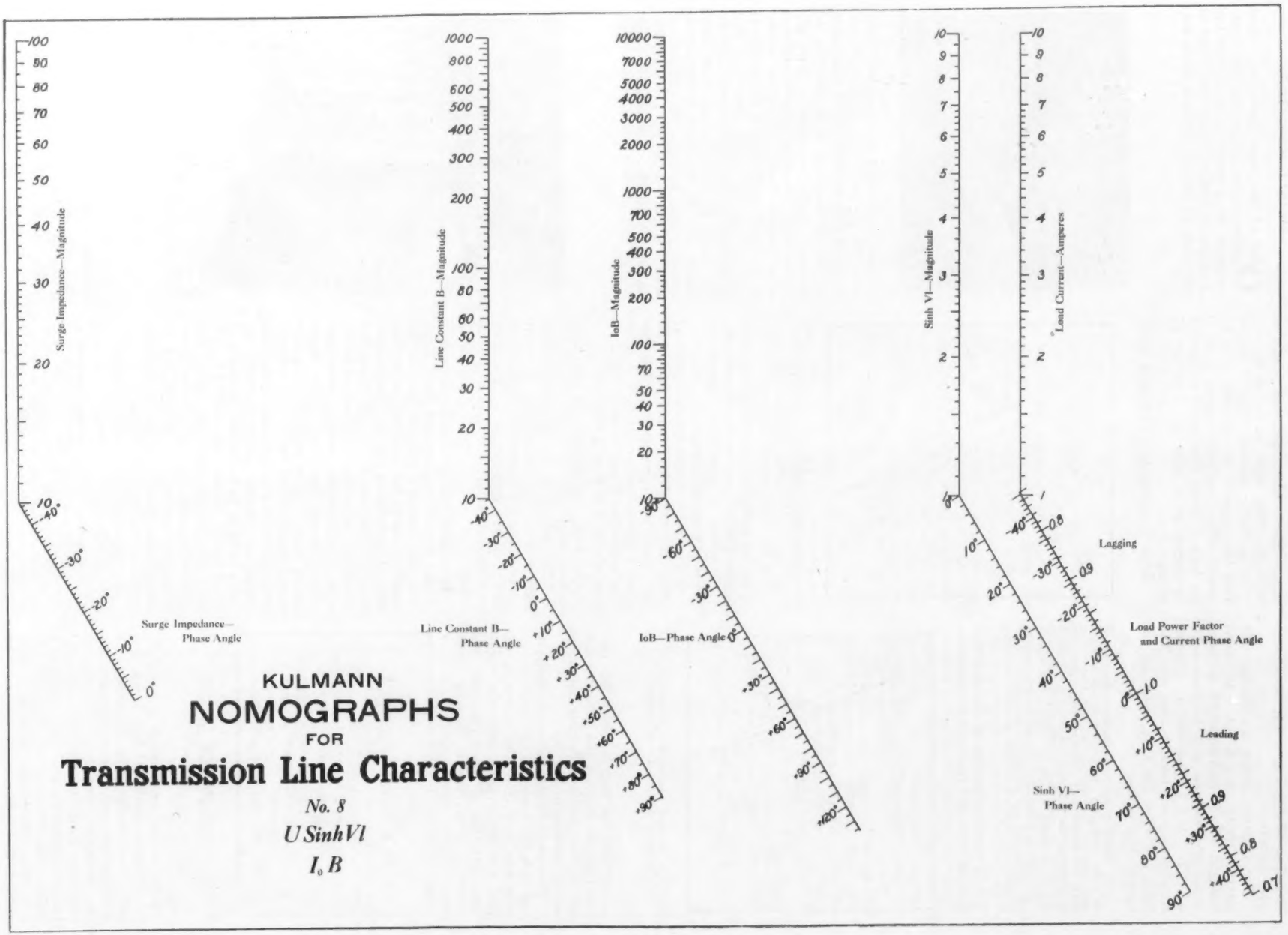
EDITOR'S NOTE: This is the third of a series of four articles by the author discussing the application of Blondel's theorem to various metering problems and giving an explanation of certain basic underlying principles. The next article will appear in an early issue of ELECTRICAL WEST.

Before and After

ONE of the seven 5,833-kva. transformers swept from the San Francisquito No. 2 power plant of the Los Angeles Bureau of Power and Light at the time of the St. Francis Dam collapse March 13, 1928, as it was being exvacated from the river bed several hundred yards downstream from the power plant (above) and as it appeared after having been completely rebuilt in the field and restored to service at the new power plant (below). This particular unit was buried 18 ft. beneath the surface of the muck and flood debris and, as explained in the article covering this salvage job ("Electrical West," April 1, 1929, pp. 210-211), was located by means of a magnetic dip-needle and excavated by means of a



power shovel. The complete field rebuilding of the first three transformer units was completed and the units restored to service within 93 days following the disaster and the remaining four units subsequently also were rebuilt completely right on the job.


Surge Impedance—Magnitude
Surge Impedance—Phase Angle
Line Constant B—Magnitude
Line Constant B—Phase Angle
IoB—Magnitude
IoB—Phase Angle
Sinh Vl—Magnitude
Load Current—Amperes
Lagging
Load Power Factor and Current Phase Angle
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Sinh Vl—Phase Angle
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NOMOGRAPHS
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Transmission Line Nomographs—No. 8

Graphical Solution for the Determination of the Numerical Value of the Second Term in the Voltage Characteristic Equation

By C. ALBERT KULMANN*, Pelton Water Wheel Company, San Francisco

CONTINUING with the solution of transmission line characteristics by means of a series of charts, the accompanying nomograph serves to evaluate the second term of the voltage characteristic equation, providing for the multiplication of the three vector quantities which make it up. The equation used and explained previously is:

$$E_1 = E_0 \text{ Cosh Vl} + I_0 \sqrt{\frac{Z}{Y}} \text{ Sinh Vl.}$$

For any given power line this reduces to

$$E_1 = E_0 A + I_0 B$$

where A and B are constants of the line, of which A was evaluated by means of Chart No. 5, and B is evaluated by means of the accompanying chart, No. 8.

Referring to the nomograph on the facing page, it may be seen that it is scaled without regard to the actual ranges of the several quantities. If the values of the factors as found on previous charts do not lie on the actual scales, conversion factors are used by which they are made to do so. By using but one logarithmic range for the magnitudes, namely, from 1 to 10, the chart is made more accurate. A similar shortening of the angle scale in one case is for the same purpose.

In using the chart, take the value of the magnitude of Sinh Vl, as found from Chart No. 7, and multiply or divide it by some multiple of ten which will bring it to a numerical value within the range of the scale of that quantity and find the corresponding scale point for that value. Proceed in the same manner with the value of

$$\sqrt{\frac{Z}{Y}}$$

as found on Chart No. 6. Then lay a straight-edge across the chart to intersect the two points so located, and read the magnitude of the line constant, B, at the point of intersection of the straight-edge with that scale.

Next proceed in the same manner with the vector angles of the quantities

$$\text{Sinh Vl and } \sqrt{\frac{Z}{Y}}$$

and find the result on the scale for the phase angle of the line constant, B. If the actual angle of Sinh Vl as previously determined is greater than 90 deg., subtract from the actual value of the true angle 90 deg. or some multiple of it and use this new value on the Sinh Vl Phase Angle scale, later adding the same amount to the result, to compensate.

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Having evaluated the line constant, B, the second term in the voltage equation is found for any condition of loading by taking the desired value of current and power factor or phase angle and by using some multiple of ten as a conversion factor, bringing the current value within the limits of the scale. Join with a straight-edge the corresponding scale point with the scale point previously found on the Line Constant B-Magnitude scale and read the magnitude of I_0B at the point of intersection with that scale. This value then is corrected by the reverse application of the same conversion factor previously applied to the current value, and progressively by the conversion factors used with the other terms.

The phase angle of the load current with respect, of course, to the load voltage, is used next. The point corresponding to its value is located on the scale so designated. This point is connected by straight-edge with the point previously located on the Line Constant B Phase Angle scale, and the value of I_0B phase angle is read at the point of intersection with that scale. If it was necessary to subtract from the true angle of Sinh Vl to bring it within the chart limits, the same amount previously subtracted must be added, as must also be the case with respect to the true value of the line constant, B.

To cite a numerical example, take Sinh Vl as having a numerical value of 0.4 with an angle of 85 deg., and

$$\sqrt{\frac{Z}{Y}}$$

as being 450 with an angle of —7 deg. Neither of the two magnitudes falls within the limits of the chart, so the former is multiplied by 10 and the latter by 0.1. In this case, the two cancel each other so the value read for the magnitude of the line constant, B, will be the true value, or 180. The angles are within the scale limits and the line constant, B, phase angle is read as 78 deg. If, however, the angle of Sinh Vl had been 185 deg., 180 deg. would have been subtracted leaving 5 deg. and this would have been the value used on the chart. Then the 180 deg. would have been added to the value of the angle as determined on the chart.

Assume with the example given that one of the conditions to be investigated is for a load current of 150 amp. with a lagging characteristic of 30 deg. The current value is multiplied by a conversion factor of 0.01 and the resulting 1.5 is located on the Load Current scale and connected by straight-edge to the value (180) previously found on the Line Constant B-Magnitude scale, and the magnitude of I_0B is read as 270. This value then is multiplied by 100 to offset the conversion factor by which the current value was divided. Thus the true magnitude of I_0B is found to be 27,000.

Proceeding with the angles, the phase angle of the load current is located on the proper scale and connected by straight-edge with the previously located point on the Line Constant B-Phase Angle scale, and the value of the phase angle of I_0B is found to be 48 deg. Thus the second term of the voltage characteristic equation for the conditions named is evaluated as $27{,}000 \angle 48°$.

EDITOR'S NOTE: This is the eighth of a series of useful nomographs dealing particularly with transmission line characteristics and prepared by the author from mathematical and experimental data. In the ninth the addition of the two terms (both vector quantities) in the voltage characteristic equation will be evaluated.

NEW BOOKS
for the Engineer

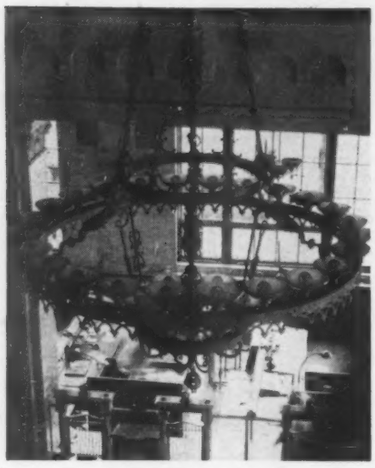
ABC OF TELEVISION, by Raymond Francis Yates, formerly editor of "Popular Radio." Cloth bound; 6 x 8½ in.; 210 pages; illustrated. Published 1929 by Norman W. Henley Publishing Company, 2 West 45th St., New York City, N. Y. Price $3—This is strictly a practical book although it is more than a handbook. Its text deals with the timely subject of television and its related equipment in a manner that may be understood by any radio amateur or radio enthusiast who may wish to build or operate this class of equipment. Theory, construction and operation of telephotographic and television transmitting and receiving apparatus are discussed in simple language. Instructions are given for the construction of home-made equipment.

UNIFORM CLASSIFICATION OF ACCOUNTS FOR ELECTRIC UTILITIES, a 118-page handbook prepared by the committee on statistics and accounts of public utilities of the National Association of Railway and Utilities Commissioners, and recommended for adoption by State Commissions in 1922. Republished in 1928 by The State Law Reporting Company, Woolworth Building, New York City. Price $1.10 (paper bound) and $2 (cloth bound).

REPORTS OF THE CONFERENCES ON CYCLES. This is an 83-page publication of the Carnegie Institution of Washington, D. C., just issued. The cyclic studies outlined include the studies under way in the Pacific Coast area concerning precipitation, tree growth and related phenomena, as well as studies of life and health cycles. Interested persons should communicate directly with the Carnegie Institution.

METHODS OF ESTIMATING THE SIGNIFIGANCE OF DIFFERENCES IN OR PROBABILITIES OF FLUCTUATIONS DUE TO RANDOM SAMPLING, by George Francis McEwen, Scripps Institution of Oceanography, La Jolla, Calif. Paper bound; 7 x 10½ in.; 137 pages. Publisned as a bulletin of the Scripps Institution by the University of California Press, Berkeley. Price $1.70.—This research report presents numerous illustrations, formulas and tables prepared expressly for use in estimating probabilities when the more usual methods, "methods of least squares" or "normal law of error," may not well apply. This is a definite contribution to the development of statistical methods. More than half its pages are devoted to reference tables based upon the author's research.

Ideas for the Contractor



A banking room fixture employing indirect lighting to the ceiling. Dense glass saucers form reflectors for the 100-watt inside frosted lamps.

BANK INSTALLS AIR BEACON IN NEON

WITH a unique aviation beacon flashing alternately red, white and blue from the tip of its tower, the new San Diego Savings Bank Building in that city is a wholly up-to-the-minute installation in all respects. While the beacon, which is described in detail on the facing page, is its most spectacular feature, the electrical equipment throughout, installed by E. R. Damarus, San Diego electrical contractor, is the result of modern practice.

Below the beacon are thirteen 500-watt floodlights to light the tower,—five on the penthouse roof and eight on the main roof to light the penthouse and front of the tower. In the building are the usual provisions for telephone, power, light and signal services.

Double beacon on tower, which is floodlighted from the roof and elevator penthouse.

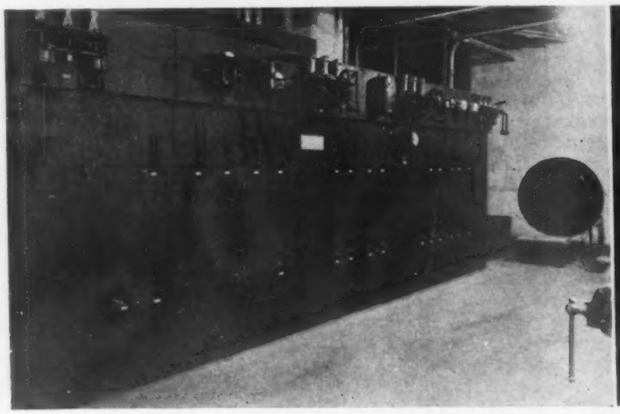
The elevators are of the automatic push button control type.

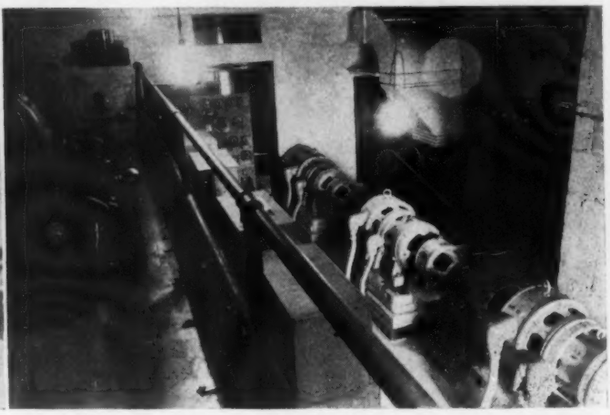
Service comes into a transformer vault in the basement from two separate primary sources, automatic throwover on the switchboard providing for emergency conditions. Three banks of transformers are installed for light, power and emergency, respectively. Feeders were dropped from the highest floor level to the main board terminating in a horizontal ceiling run of 90 ft. under the main floor to the switchboard. A busing chamber at the top of the board was used for all connections.

A special feature of the safety deposit vault is the automatic control on the gates of the heavy steel grille between the reception room and vaults. Push buttons at three stations behind the counter give the attendent control of the gate. An 8-hp. single-phase motor, capable of a quarter turn in either direction, is used to open or close the air valve which operates the gate.

The banking room is equipped with auto-call buttons at each teller's wicket and a call light above his wicket for the floor man.

Push buttons under the counter actuate relays in the can shown open and operate motor a quarter turn to open the air valve controlling the vault grille gates.





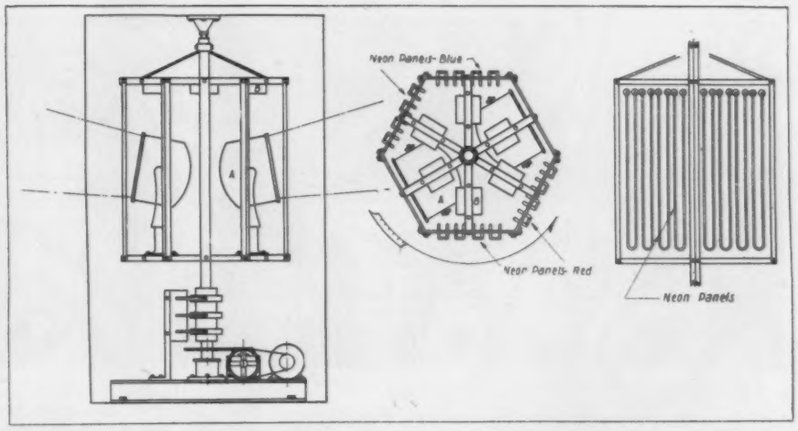
Left: Main switchboard in the basement. Note the black circle on the transformer vault wall, at the center of which is the main oil switch handle, acting as main switch. *Right*: Eleva tor apparatus for full automatic push button control.

BEACONS

Some Recent Airway Markers Installed by San Diego Contractor in the Southwest.

CONSIDERABLE experience with beacons for various kinds and styles of airway markers has come to the California Electric Works of San Diego, which constructed and installed the beacon on the San Diego Savings Bank Building, mentioned on the facing page. This included the electrical installation for the Standard Oil Company's beacon on San Miguel Mountain, the Richfield tower and beacon near Palm City, and the beacon at the fashionable Mexican Monte Carlo, Agua Caliente, all illustrated here.

Of these the San Diego Savings Bank beacon is perhaps most unique. Hexagonal steel framework mounted on ball bearings and revolved by a small motor through belt and gear reduction at 3 r.p.m. supports the two 18-in., 1,000-watt, 110-volt beacons and two panels of Neon tubing, one blue the other red, and the six 110/12,000-volt transformers for the Neon. Current is supplied by means of sliprings and brushes through a 3-wire grounded neutral system. Six branch blocks are provided for the Neon transformers and two for the searchlights. All high-tension electrodes are brought in at the top to the transformers, also located there, making for short high-tension leads and lessened danger of shock if a man is working in the framework. The Neon panels are a single galvanized supporting sheet.



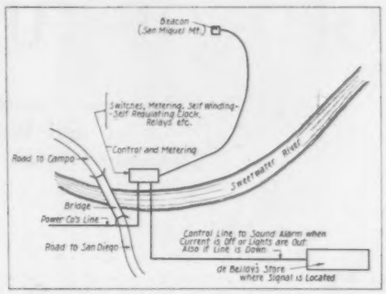
Construction details of the San Diego Savings Bank beacon, showing slip ring and brush power feed, beacons (A) and transformers (B) for the Neon panels.

The Standard Oil Company's beacon on Mount San Miguel, near San Diego, two 36-in. units, one a revolving beacon on top, the other a fixed beacon pointing to North Island airport below it, with Neon letters flashing S-M in Morse code mounted on the tower.

One of the many Richfield beacon and service station installations is this one at Palm City, with Neon letters on the tower, field lights, etc.

As the searchlights back each other the effect gained is of six flashes per minute interspersed first by a red and next a blue flash. Hourly inspection of the operation is made by the night watchman. An automatic time switch controls the operation, with remote control and pilot light in the engine room. A 24-in., 1,000-watt beacon fixed on the building roof points to North Island airport.

This company makes monthly service inspection of almost all of this beacon equipment in the San Diego territory.


Beacon (San Miguel Mt.)
Switches, Metering, Self Winding-Self Regulating Clock, Relays, etc.
Control and Metering
Road to Campo
Sweetwater River
Bridge
Power Co's Line
Road to San Diego
Control Line, to Sound Alarm when Current is Off or Lights are Out. Also if Line is Down.
At Below) Store where Signal is Located

Map showing comparative locations of the Standard Oil beacon, its source of power switching control station and alarm to notify when power is off or a line down.

Campanile at entranceway to Agua Caliente, Tijuana, Mexico. A 24-in. revolving beacon, a red bullseye of Neon tubing and mirror reflector and green Neon outlining on the exterior are the airway equipment of the cupola on its top.

The real garage is under the rear of the house. The office and shop with through driveway to the yard are at the rear of this contractor's big walled "garden."

OUT OF HIS "GARAGE"

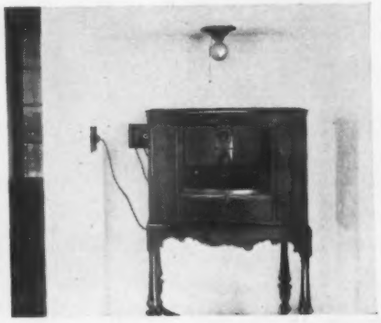
San Jose Electragist Conceals Office, Shop, Truck Garage and Warehouse in What Resembles Large Double Garage Behind His Home.

A DE LUXE edition of the contractor who "works out of his garage" is Roy Butcher, Electragist of San Jose, Calif. His, however, is no "curbstone" business, for it is conducted on Electragist principles throughout.

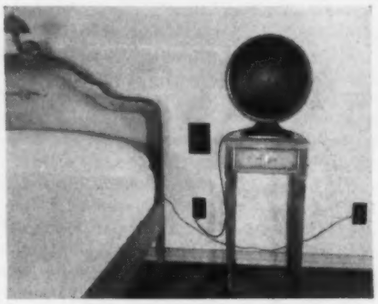
As illustrated here, what looks like a garage is his shop and office, in which trucks are stored at night, may enter and pick up material for jobs during the day, and drive through to load or unload heavy equipment in the walled yard—all of which conforms with residential zoning restrictions.

A blower installed in the fresh air return line to the furnace can be used for cooling the house in summer time.

The home is unique for its double heating system, electric heaters with rear can removed being set in hot air duct entrances for radiators or for individual room heaters. It also has a fan on the fresh air line which helps cool the house in summer, radio control from various parts of the house, lights under the house because "you never know when you have to get under there," burglar lighting system—everything in fact which makes it the best kind of demonstration display of what a home should have electrically for full enjoyment.



The radio set in its niche off the living room can be started remotely from other parts of the house where loud speaker jacks are installed.



The master's bedroom, with radio control and burglar light control at the bedside.

The combined truck garage where materials may be loaded, and storehouse, through which trucks may be driven (note wire gate) to unload or to enter storeyard at rear.

Light That Gets Out From Under

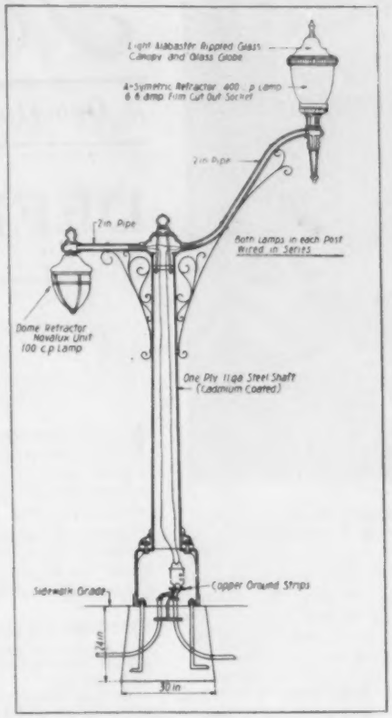
DOWN in Imperial Valley where it gets hot on summer days most of the sidewalks are covered over, either by a projecting marque or by the second story of the buildings themselves. This makes the problem of street lighting particularly difficult. Most cities are content with the bracket-type street lighting units which illuminate the streets only, with perhaps separate lighting fixtures for the sidewalks, either furnished by the merchants or on some similar arrangement.

In Brawley, Calif., however, a new type of street-lighting standard was evolved which has been given the name of that city. This standard, as illustrated herewith, consists of two brackets, one extending out from under these balconies to illuminate the street, the other extending under the balcony for the sidewalk lighting. Thirty-one of these double units were installed in a recent program, together with 47 single standards on streets not so covered by balconies.

On the street side a 4,000-lumen lamp was used with a dome refractor and a light alabaster rippled glass canopy. Novalux rippled glass units were used. On the sidewalk side a 2,500-lumen lamp was used with similar glassware but without a canopy.

The standard is of Union metal, cadmium-coated and finished in bronze.

The design for this post was made by the city engineer of Brawley. The installation was made by the Street Lighting Engineering Company of San Bernardino, Calif.


Light Alabaster Rippled Glass Canopy and Glass Globe
Asymmetric Refractor, 400 - p Lamp 6.6 amp. from Cut Out Socket
2in. Pipe
2in. Pipe
Both Lamps in each Post Wired in Series
Dome Refractor Novalux Unit 100 c.p Lamp
One Pty 11 gage Steel Shaft (Cadmium Coated)
Sidewalk Grade
Copper Ground Strap
24in.
30 in

Above: a photograph of one of the standards. *Left*: a diagram showing construction details. The picture shows how the lower unit extends under the overhanging balcony to light the sidewalk.

Fresno Church Heated Completely by Electricity

Three stories tall, of brick and concrete, the Trinity Methodist Episcopal Church, Fresno, Calif., is heated by wall-type units; the chapel, its largest room, by eight 5-kw. heaters. Electricity provides heating for one or several rooms as desired without a central heating system. The kitchen has a duplex range, warming table, plate closet, 10-gal. coffee urn and 40-gal. water heater, all electric. Control is centered at the main board shown at left. All heating circuits are 220-volt, a total of 180 kw. being installed. George Zelhart sold the installation and it was wired by A. A. Dorfmeier. Metering for light, kitchen and heating is separate.

Christmas Store of
SIDNEY MAYER CO.
Machinery Merchants
PRACTICAL ELECTRICAL TOOLS AT THE PRICE OF TOYS...
MACHINERY MERCHANTS
AN IDEAL GIFT FOR MAN OR BOY

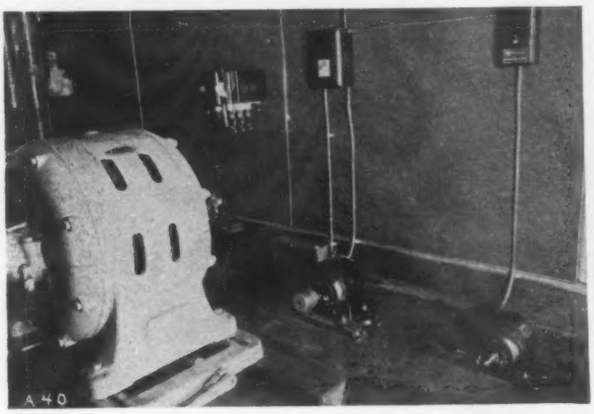
Sells Electric Tools for Christmas

ALTHOUGH his establishment itself was in the industrial district far from shopping crowds, Sydney E. Mayer, machinery dealer of San Diego, rented a vacant store in the shopping district last year and did a good volume selling small electric tools for Christmas gifts. It was a simple set-up, a window full of home-shop lathes, saw tables, jig saws, spray outfits, portable drills, etc.; a sign extolling "Practical electrical tools at the price of toys, an ideal gift for man or boy."

Mr. Mayer said of his experiment: "Results were not what we expected but we made enough gross to pay expenses, and received quite a few prospects for larger equipment. I would say that it was very good advertising and productive of results in the long run." Mr. Mayer said he planned to repeat the experiment this year. Motor dealers in favorable trade locations should be able to capitalize upon this idea.

Kept "Hot" for Customers

DEMONSTRATION is half the battle in selling push-button control for individual motor drive. Tinling & Powell, industrial contractors and motor dealers, of Spokane, Wash., found this out many moons ago and installed, as a consequence, sample layouts on the floor of their display room. Control box and push button are mounted on the wall and the motor below it in such a way that a demonstration can be given to any customer who enters. An oil switch or contactor with the can removed from the bottom is also mounted on this wall so that its features can be pointed out and the operation explained. It, however, is not kept "hot."



MOTOR

A Department for and by Motor Specialists

DEFINITIONS

Approved American Standards Definitions of Control Equipment Classifications Alphabetically Arranged.

EVERY motor dealer should have a thorough knowledge of control equipment classifications and the conditions under which each class is designed to operate. The definitions which follow are established as the American Standard definitions by the American Standards Committee of the U. S. Bureau of Standards. In some cases they have been amplified upon in order to give a clearer interpretation of them. These data were arranged in this order by the General Electric Company, to which acknowledgment is made for their use.

Constant Torque Resistor (Machine Duty)
* A resistor for use in the armature or rotor circuit of a motor in which the current remains practically constant throughout the entire speed range.—Amer. Std. This means that the horsepower output of the motor decreases directly with the speed as in the case of a motor driving a plunger pump. Here the work done by the motor at one-half speed is one-half that done at full speed. The term machine duty is not meant to imply that any motor driving a machine should have a machine duty resistor.

Continuous Duty
A requirement of service that demands operation at substantially constant load for an unlimited period.—Amer. Std.

Disconnecting Switch
A disconnecting switch is a switch which is intended to open a circuit only after the load has been thrown off by some other means.—Amer. Std.

Drip-tight Apparatus
Apparatus so protected as to exclude falling moisture or dirt. Drip-tight apparatus may be semi-enclosed apparatus if it is provided with suitable protection integral with the apparatus, or so enclosed as to exclude effectively falling solid or liquid material.—Amer. Std.

Drum Controller
A drum controller is a controller that utilizes a drum switch as the main switching element.—Amer. Std.

Drum Switch
A drum switch is a switch having electrical connecting parts in the form of fingers held by spring pressure against contact segments or surfaces on the periphery of a rotating cylinder or sector. —Amer. Std.

Dust-proof Apparatus
Apparatus so constructed or protected that the accumulation of dust will not interfere with its successful operation.—Amer. Std.

Dust-tight Apparatus
Apparatus so constructed that the enclosing case will exlude dust. —Amer. Std.

Duty of a Controller
The specific function or functions that are designed to be accomplished, with respect to the operation of the motor; such as starting, speed control, reversing, and stopping; and, in addition, the frequency and length of time of operation.—Amer. Std.

Electric Controller
A device, or group of devices, which serves to govern in some predetermined manner, the electric power delivered to the apparatus to which it is connected.—Amer. Std.

NOTE—The term "controller," therefore, is properly applied to the dial type starters, rheostats, contactor panels, etc. It is not limited to controllers of the drum type.

Fan-duty Resistor
* A resistor for use in the armature or rotor circuit of a motor in which the current is approximately proportional to the speed of the motor.—Amer. Std. For example, a fan driven at one-half its normal speed requires less than one-half as much torque as it would require running at its normal speed and the work done by the motor will be less than one-quarter as much as that done at normal speed.

* The two types of regulating resistors are laid out very differently in ohmic value and current carrying capacity and can not be used interchangeably. All orders for such resistors should specify whether they are for machine or fan duty.

Amer. Std. = American Standard.

FORUM

in the Interest of a Better Motor Trade

Full Magnetic Controller
A controller having all its †basic functions performed by electromagnets.—Amer. Std.

Fume Resisting
EXAMPLE—One which performs all of its operations after the closure of the master switch, such as a magnetic control panel with "start and stop" push button station.

Apparatus so constructed that it will not be readily injured by the specified fumes.—Amer. Std.

Gas-proof Apparatus
Apparatus so constructed or protected that the specified gas will not interfere with its successful operation.—Amer. Std.

Gas-tight Apparatus
Apparatus so constructed that the specified gas will not enter the enclosing case under specified conditions of pressure.—Amer. Std.

Machine Duty
See Constant Torque Resistor.

Magnetic Contactor
A contactor actuated by electro-magnetic means.—Amer. Std.
EXAMPLE—Shunt contactor.

Manual Controller
A controller having all of its †basic functions performed by hand.—Amer. Std.
EXAMPLE—A hand-starting rheostat or drum type controller.

Master Switch
A device which serves to govern the operation of contactors and auxiliary devices of an electric controller.—Amer. Std.

EXAMPLE—A master switch may be automatic, such as a float switch or pressure regulator, or it may be manually operated such as a drum, push button or knife switch.

Moisture-resisting Apparatus
Apparatus so constructed or treated that it will not be readily injured by moisture. (Such apparatus shall be capable of operating in a very humid atmosphere, such as found in mines, evaporating rooms, etc.)—Amer. Std.

Open-phase Relay
A relay that functions by reason of the opening of one phase of a polyphase circuit.—Amer. Std.

Overload Protection
The effect of a device operative on excessive current, to cause and maintain the interruption of current flow to the device governed. When it is a function of a controller for a motor, the device employed shall provide for interrupting any ‡operating overloads, but shall not be required to interrupt short circuits.—Amer. Std.

Overload Relay
An overcurrent relay in the circuit of a motor that functions at a predetermined value of the current to cause the disconnection of the motor from the line.—Amer. Std.

Periodic Duty
A requirement of service that demands operation for alternate periods of load and rest in which the load conditions are well defined and recurrent as to magnitude, duration, and character.—Amer. Std.

Phase-failure Protection
The effect of a device operative on the failure of power in one wire of a polyphase circuit to cause and maintain the interruption of power on the circuit.—Amer. Std.

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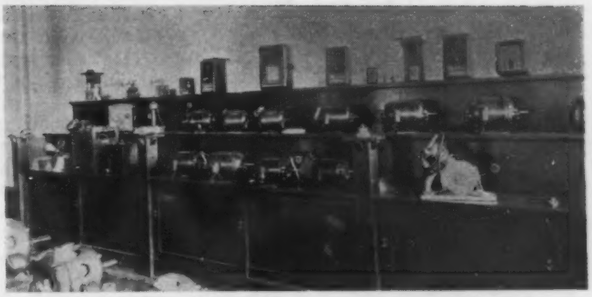
† By basic function is usually meant acceleration, retardation, line closing and reversing.—Amer. Std.

‡ By operating loads is meant a current not in excess of six times the rated full-load current for alternating-current motors or four times the full-load current for direct-current motors.—Amer.Std.



Steps to Motor Sales

DISPLAY of small motors, controllers, ammeters, voltmeters and other small items handled by them is made by Tinling & Powell, motor dealers and industrial contractors, of Spokane, Wash. A set of display racks as shown in the photograph provides ample space for arranging these items attractively so that all who enter the shop may see them. Plug outlets are located on the face of the steps

Phase-reversal Protection
The effect of a device operative on the reversal of the phase rotation in a polyphase circuit to cause and maintain the interruption of power in all of the circuit.—Amer. Std.

Relay
A device that is operative by a variation in the conditions of one electric circuit to effect the operation of other devices in the same or another electric circuit.—Amer. Std.

Resistance
The opposition that is offered by a substance or body to the passage through it of an electric current and that converts electric energy into heat; it is the reciprocal of conductance.—Amer. Std.

Resistor
A device used primarily because it possesses the property of electrical resistance. A resistor as used in electric circuits for purposes of operation, protection, or control commonly consists of an aggregation of units.—Amer. Std. (See table below.)

Rheostat
A resistor which is provided with means for readily varying its resistance.—Amer. Std.

Semi-magnetic Controller
A controller having part of its basic functions performed by electromagnets and part by other means.—Amer. Std.

Service of a Controller
The specific application in which the controller is to be used, as for example:
(*a*) General purpose, which covers the occasional starting of motors.
(*b*) Crane and hoist.
(*c*) Elevator.
(*d*) Machine tool, etc.—Amer. Std.

Splash-proof Apparatus
Apparatus so constructed and protected that external splashing will not interfere with its successful operation.—Amer. Std.

Submersible Apparatus
Apparatus so constructed that it will operate successfully when submerged in water under specified conditions of pressure and time.—Amer. Std.

Temperature Relay
A relay that functions at a predetermined temperature in the apparatus protected.—Amer. Std.

Undervoltage Protection
The effect of a device operative on the reduction or failure of voltage to cause and maintain the interruption of power to the main circuit.—Amer. Std.

Undervoltage Release
The effect of a device operative on the reduction or failure of voltage to cause the interruption of power to the main circuit but not to prevent the re-establishment of the main circuit on reutrn of voltage.—Amer. Std.

American Standard Resistor Classification

Approx. Per Cent of Full-Load Current on First Point	15 Seconds Out of 4 Minutes	30 Seconds out of 4 Minutes	45 Seconds Out of 4 Minutes	1 Minute Out of 4 Minutes	1½ Minutes Out of 4 Minutes	2 Minutes Out of 4 Minutes	Continuous
25	No. 11	No. 31	No. 41	No. 51	No. 61	No. 71	No. 91
50	No. 12	No. 32	No. 42	No. 52	No. 62	No. 72	No. 92
70	No. 13	No. 33	No. 43	No. 53	No. 63	No. 73	No. 93
100	No. 14	No. 34	No. 44	No. 54	No. 64	No. 74	No. 94
150	No. 15	No. 35	No. 45	No. 55	No. 65	No. 75	No. 95
200 or over	No. 16	No. 36	No. 46	No. 56	No. 66	No. 76	No. 96

The above table is based on a continued performance for one hour. It is understood that the steps of resistance will be cut out at equal intervals in the "time on" period of the cycle specified and that the average accelerating current will not exceed 125 per cent of the full load value.

NEW STATE LICENSE LAW

California Act Analyzed as to Meaning to All Electrical Contractors.

CALIFORNIA'S Legislature at its last session passed a new law requiring all contractors of any kind in the state to be licensed by the state. This is in addition to any local license regulation under which their own particular business falls. This means that all electrical contractors in California will be required by law to hold a state license for any work undertaken whose gross construction and material cost amounts to $200 or over.

Earl E. Browne, former contributor to "Electrical West," and now manager of the Electrical Contractors and Dealers Association of San Francisco, in his customary analytical and direct method, has summed up the entire law in a brief, terse and complete form. This analysis, which gives the essential structure of the law and its provisions, follows:

Section 1.—License Requirement.

Unlawful to act as contractor without license, unless particularly exempted by provisions of this act.

Section 2.—Exemptions from Provisions of this Act.

(a) Public officers—national, state, local.

(b) Construction incidental to irrigation and drainage ditches, farming, dairying, stock or poultry raising.

(c) Trust or court officers acting within terms of their trust or office.

(d) Public utilities on work incidental to their own business.

(e) Sole owners constructing structures, or drilling oil wells, on own property for own use.

(f) Casual construction operations under $200 total.

Section 3.—Definition of Contractor.

One who for compensation, other than wages, undertakes with another for construction, alteration or repair of a structure.

Shall include subcontractor, but not anyone who merely furnishes material or supplies.

Section 4.—Registrar.

Director of Department of Professional and Vocational Standards constituted registrar.

May employ assistants and procure equipment and records.

Section 5.—Application and Fee.

Applications to be submitted on prescribed forms, duly verified, showing general nature of contracting business, giving names and addresses of principals, partners, officers ond construction manager.

Fee of $5 must accompany application.

Fees to be deposited in contractors' license fund.

Unemcumbered surplus in fund to be transferred annually to general fund of the state.

Contractors have been given until Nov. 1 to put in an application for a license at the price named; after Nov. 1 the cost of a license will be increased, and any contractor doing work without a license after the law is in effect will be subject to a fine of $500.

For application blanks address James F. Collins, Registrar of Contractors, State Capitol, Sacramento, Calif.

The application form is a mimeographed sheet containing space for three classifications which it makes and which must be filled out accordingly. These classifications are: (1) for a sole owner, (2) for a co-partnership, (3) for a corporation or association. In each case the owners, partners or firm officers are to be named. On the back of the form is an affidavit to be sworn to verifying the information given on the face of the application.

Section 9.—It is this section which has the "teeth." Under its provisions any contractor can be prosecuted as follows:

"Any person, firm, corporation or organization may file with registrar verified complaint charging a licensee with one or more of the following acts or omissions: (1) Abandonment of contract without legal excuse; (2) diversion of funds from any contract, and their application to another contract, with intent to defraud or deceive creditors or owner; (3) fraudulent departure from, or disregard of, plans or specifications without consent of owner, or doing of any willful, fraudulent act as a contractor which substantially injures another; (4) willful or deliberate disregard or violation of the building code, or safety or labor laws, under which the licensee may be operating."

Continuing a Series on the Planning and Selling of Industrial Lighting by the Contractor.

MOUNTING HEIGHTS AND INTENSITIES

By J. R. WILSON
Quality Electric Works, Los Angeles.

IN A PREVIOUS section of this series a table for spacing distance and a table for mounting height were given. To give a better understanding of the relationship between the factors governing correct industrial lighting, two charts, one on mounting height and spacing, and another on area, intensity and size of lamp, are reproduced here. These charts will be found very handy and their use will be fully explained.

Correct Number of Units

Several factors must be considered in determining the correct number of units to use for any lighting installation. The principal factors are architectural construction of the building, type of lighting (general, group or local) and type of reflector chosen. As a typical example of a common type of industrial installation let us consider a machine shop. Say it has been decided to have a scheme of general overhead lighting. Assume there are no crane bays or runways in this particular shop. In this type of installation the R.L.M. reflector usually will do the work very well if the ceilings are not high enough to require the bowl type of reflector.

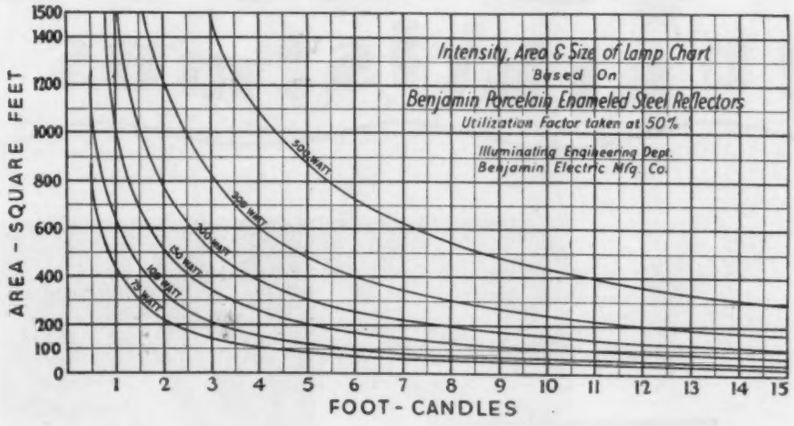
With today's usual type of shop construction it will be possible to use a mounting height from 7½ to 9 ft. above the working plane. Assume the working plane to be 2½ ft. above the floor and that we can mount the reflectors 8 ft. above the working plane. The total mounting height will then be 10½ ft. (2½ x 8 ft.) above the floor. Now, by reference to Chart D, given herewith, the spacing distance for the R.L.M. reflectors at this mounting height will be found to be 12 ft.

The next step is to divide the total area to be lighted into equal parts, 12-ft. square, and place a unit in the center of each of these squares. This scheme will give uniform illumination throughout the entire area.

Should the overhead construction of the building not lend itself to this spacing, it is possible to divide the area to correspond to the bays formed by the overhead construction. If this system of spacing is used, the spacing distance for a given mounting height should not be greater than the ratio given in Chart D. This may entail the use of a greater number of units, but these can be made comparatively small.

While eight types of metal reflectors for industrial plant application were listed in a previous article in this series, in reality one of four distinct types will just about meet the requirements of any case. These four types are R.L.M.,

Chart C—Area, Intensity and Size of Lamp Guide



bowl, shallow bowl, and angle type. Chart D shows curves for only three of these types. The use of angle reflectors will be treated under a separate heading. To show the practical value of the two charts given herewith, the manner of their use in making calculations will be considered.

Using Chart D

As stated before, the distance between reflectors is in constant proportion to the mounting height. This ratio remains the same for all sizes of one type of reflector. However, the ratio for one type is different from that for other types. Use of Chart D will show the proper mounting heights for each of three standard types of porcelain enameled industrial reflectors. In many buildings erected for low rental the outlets are already installed but no fixtures are furnished. If these outlets are spaced in a symmetrical manner the height at which the fixtures must be mounted to give the best results may be determined by consulting Chart D.

For instance, suppose the outlets are spaced 16 ft. apart and the use of R.L.M. reflectors is desired. Consult Chart D and find the intersection of the vertical line, extending from 16 ft. at the bottom of the chart, with the diagonal line marked "R.L.M. Standard Dome." Now, the horizontal line crossing this intersection equals 13¼ on the lefthand scale, which is the correct mounting height to use.

If it is a new installation (no outlets in place) the chart can be used to find the proper spacing, based on a predetermined mounting height. To do this, locate the intersection of the mounting height horizontal line with the diagonal reflector line. By following the intersecting vertical line to the bottom scale the proper spacing can be ascertained.

Using Chart C

As shown in a preceding table of recommended illuminating values, each kind of industry or operation has been placed upon a definite foot-candle basis. To find the proper size of lamp to use, so that a desired foot-candle degree of illumination will be realized, let us consider a typical case.

For example, suppose it is desired to provide illumination for the buffing and grinding department of a plant. First, consulting the table of recommended foot-candles for this class of work, it is found that 8 foot-candles are required. For purposes of this example, suppose the bays are 12 x 12 ft. with a unit in the center of each bay. Then each unit must provide light for 144 sq.ft. of area.

The chart does not show 144 sq.ft., so an imaginary horizontal line will be drawn at a point between 100 and 200 sq.ft. and called 150 sq.ft. At the point of intersection of this line with the vertical line above the figure 8 on the lower foot-candle scale we find the curved line marked "150 watt." This then is the proper size of lamp to use for this typical example. If the line of intersection falls at a considerable distance above any of the curved lines, use the larger size of lamp for best results.

Where this method of selection indicates lamps, and therefore reflectors, of considerable size, it is sometimes possible to re-arrange the spacing of outlets to use an increased number of smaller units. In many cases this will make for ultimate economy.

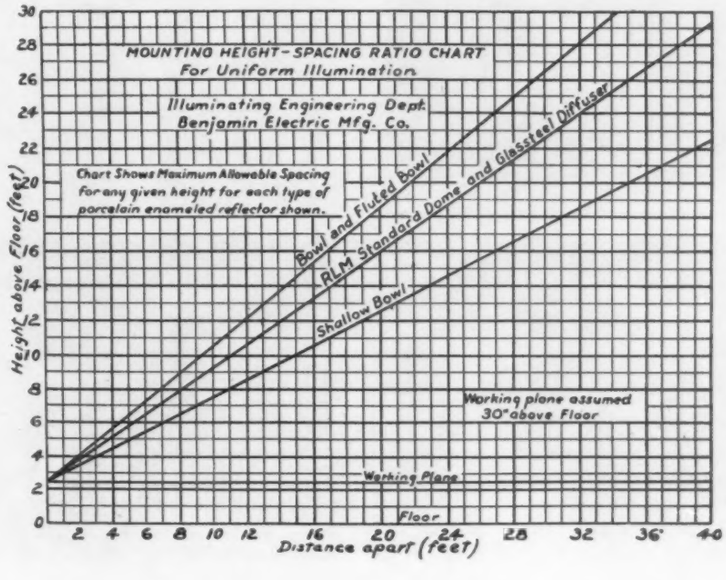
As shown by Chart C, it is possible to determine either area, intensity or size, where two of these factors are known. As an example, suppose it is desired to use 200-watt lamps and obtain an intensity of 3 foot-candles. Following the given lines to their intersection we find that each 200-watt lamp can cover 500 sq.ft. and give a 3-foot-candle degree of illumination over this area. With this data it then becomes easy to determine the dimensions of the bays. This in turn gives the spacing, and the mounting height can be determined from Chart D.

Another example: Suppose it is desired to light bays of 400-sq.ft. area with 200-watt lamps. What will be the intensity obtained? Tracing the "given quantity lines" to their intersection gives 3¾. This then is the resultant illumination value. It can be seen readily that this method is very valuable in checking illumination values on jobs that are already installed.

Still another example: Suppose a given area of 400 sq.ft. and it is required to obtain 11 foot-candles on the working plane. What size lamp must be used? Consulting Chart C, it is found that the vertical line above 11 foot-candles intersects the horizontal 400-sq.ft. line at the 500-watt lamp curve. Therefore the 500-watt lamp will give the desired 11 foot-candles over the required area.

Chart D—Mounting Height and Spacing Ratio for Uniform Illumination

For Method of Using This Chart See Top of Following Page

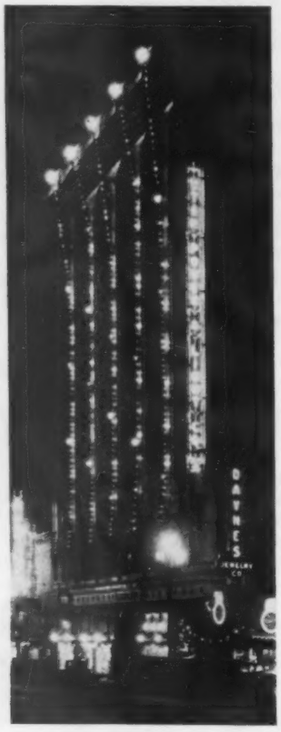

MOUNTING HEIGHT-SPACING RATIO CHART
For Uniform Illumination
Illuminating Engineering Dept.
Benjamin Electric Mfg. Co.
Chart Shows Maximum Allowable Spacing for any given height for each type of porcelain enameled reflector shown.
Bowl and Fluted Bowl
R.L.M. Standard Dome and Glassteel Diffuser
Shallow Bowl
Working plane assumed 30" above Floor
Working Plane
Floor
Height above Floor (feet)
Distance apart (feet)

better christmas

COMMUNITY CHRISTMAS LIGHTING

EACH year's Yuletide lighting decoration exceeds the last and each year a bigger market is developed for lamps, wiring materials, lighting equipment. Start early to make 1929, the year of Light's Jubilee, the most spectacular in outdoor and indoor lighting decoration.

Right: The outdoor Christmas tree,—there were thousands of these all over the West last year. The appetite is all whetted for more this year. Start the movement for your city's celebration with your own tree. Floodlight entire gardens in color. Example is the best salesman.



Below: Architectural charm enhanced by light. Ogden, Utah, last year had its first contest. One of the prize winners is shown here.

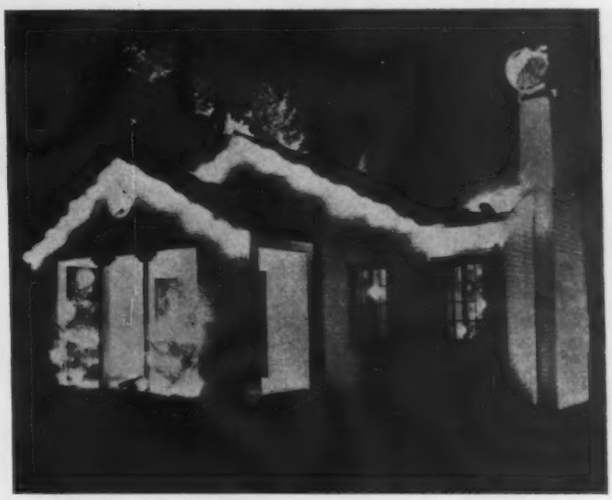
Whole city streets can be festooned with light, buildings floodlighted and business districts made to vie with each other in their attractive Christmas decorations. The Utah Power & Light Company last year set the example in Salt Lake City.

Below: Whether in Rocky Mountain snows or Southern California "climate" the field is there. At left is an attractive home in Ogden, Utah, where the first contest was held last year. At right is a Los Angeles home, also the result of the first movement of its kind last year. Southern California set a goal for 25,000 lighted outdoor trees last season and exceeded it by far. Northern California likewise set its quota and met it. The P. G. and E. is now advertising and advocating the installation of outdoor convenience outlets for use when decorating trees for Christmas or for outdoor parties.

merchandising

Above: Winner of Spokane's first contest last year. Large red candles at the door, flickering candles at each window, flickering red lights in the tree, red lights in the wreath, the whole flooded in white light, won the prize.

Below: Arizona made history last year in holiday lighting. Carol singing at the Central Arizona Light & Power Building, over a mile of lights on the highway between Globe and Miami, "the longest string in the world" it was claimed, and other features made the event noteworthy. Below is the home of Mr. Morairty, manager of the utility company at Phoenix, in holiday dress. One unforgetable entry in Phoenix's contest was McCahan Memorial Chapel, north of the Arizona canal, a chapel which ministers to tubercular patients on the desert. Both the chapel and the giant Sahuaro growing in front of it were festooned with Christmas lights.



Below: Entire business districts, like this in Salt Lake City last year, were alive with color from festoons of light. This was true all over the West. It will be extended this year. But Salt Lake City inaugurated another idea worth developing in any city having an ornamental street lighting system of high intensity. Frames of light metal in the shape of a cylinder were made so that sheets of celoglass, a wire screen whose meshes have been filled with transparent colored lacquer, could be inserted. Red and green were the colors used. The street lights in the lower right corner can be seen equipped with these color hoods. The effect was remarkable. Moreover by changing color screens the same equipment can be used for other civic festival occasions.

MODERN CHRISTMAS MODERN GIFTS

Elevate the appliances on display at the rear of the window so that they may be seen clearly above those in front, and then light the window well, as this of the B. C. Electric Railway Company is lighted.

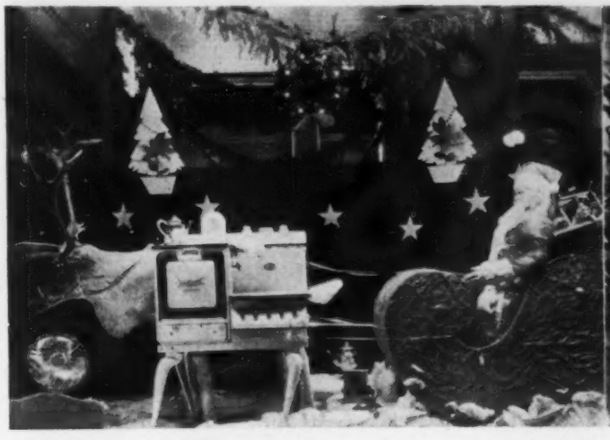
NOTHING is so modern as electricity and the electrical gift. It fits into the ultimate home everyone wishes to have. It brings yesterday's home just so much closer the ideal sought after, a place of comfort, beauty and convenience. The display of electrical gifts at Christmas should be keyed to express this idea by newness, freshness, brightness and color.

The successful electrical store, like that of the Valley Electrical Supply Company, Fresno, makes a department store of its show room. A touch of the modernistic is added by the colored horns projecting from each of the columns. There is abundant sparkle in this display.

Mammoth colored candles on portable stands arranged about the sales floor of the Utah Power & Light Company, Salt Lake City (*left*) gave an unusual touch to the display. Tables of appliances, tiers of appliances, all accessible to the shopper, introduced department store sales methods. This is something which the modern merchant of electrical goods may take from these more experienced institutions.

Simple, modern setting for simplified modern housekeeping with an electric refrigerator. The display corner shown at the right was used last year by the Puget Sound Power & Light Company with telling results.

Last year the Hotpoint company conducted a Christmas window contest. Entries were received from all over the West. Although not winners of prizes the two windows shown below certainly stopped Christmas shoppers in their tracks. The one at the left was designed by B. B. Collie and set up in the Oakland office window of the Great Western Power Company. The legs were detached and made to move. Changing color lighting likewise attracted attention. The window on the right was one arranged by the staff of the Utah Power & Light Company at St. Anthony, Idaho. The novel effect of Santa Claus carrying the range for his pack and a bagful of appliances in front of him caused all who walked by to stop.



ELECTRICAL TOYS SELL

MONTHS ahead, the Southern Colorado Power Company, Pueblo, Colo., had definitely determined what the major crowd-catcher for its Christmas window display would be—a sensitive relay tube set. It turned out to be everything that was hoped for it. This set was established to enable passers to set in motion at will an electric toy train or anything else connected with it.

The wire was attached by a sticker to the window-pane at a convenient height from the sidewalk. A card invited the passer to "touch this spot."

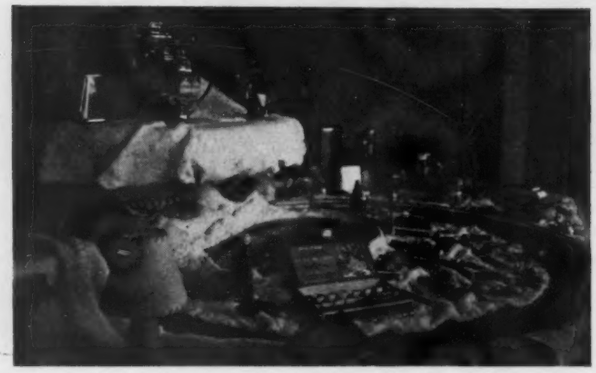
Of course, as soon as the glass was touched, the condenser effect of the passer's body was sufficient to start the electrical apparatus in operation. When the finger was withdrawn, it stopped.

There had never been anything like this in Pueblo before, and it made a hit. Left in operation far into the night, it continued to claim popularity.

Moving train in the window of Heumphreus-Smith Electric Company of Santa Barbara, last year, moved toys, lamp sets and appliances.

In fact, the continuous operation which was forced upon the electric locomotives wore them out at such a prodigious rate that each day considerable time had to be given to the task of putting them in shape again. During three weeks, four locomotives were used.

This window idea naturally created public interest in the company's electrical toy department. This was established in the basement room used throughout the year as an auditorium.



A speeding electric racing car in the window track of the Just-Rite Electric Company of Watsonville, Calif., last Christmas brought attention and trade to the company's new store.

One of the features of the basement display was a forest of Christmas trees—24 of them—all equipped with Christmas tree sets. Electric trains were set up on a special central platform.

The problem of a platform was solved in an economical way by Thomas Edmiston, display expert of the Southern Colorado company. He secured from a piano store in the same block two piano boxes and put them together end to end in the center of the floor. A platform thus was created about 15 ft. square and a little over 2 ft. high.

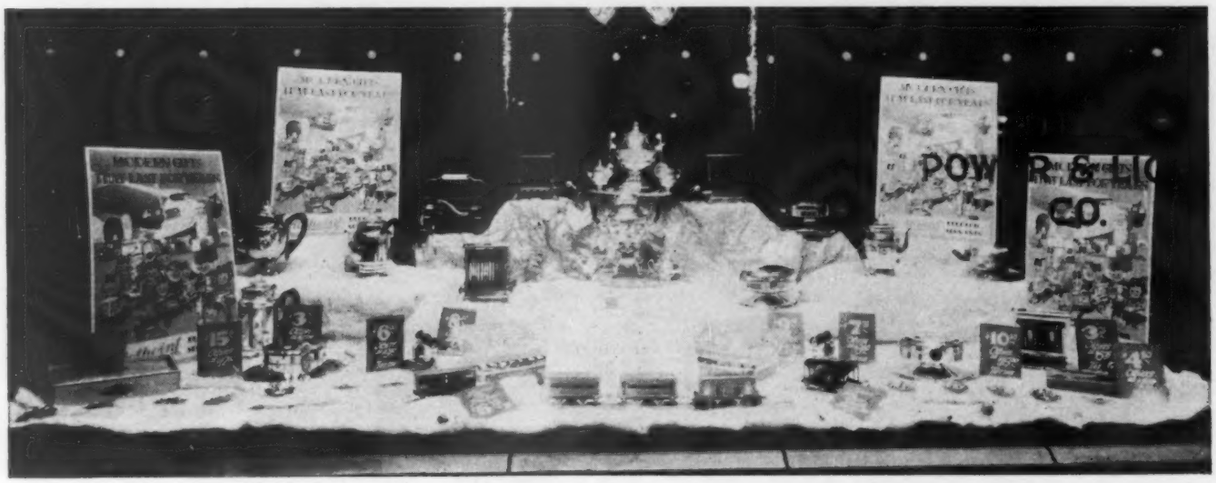
An electrical train department needs a skilled demonstrator. Such a one was found in a keen youngster, the son of Mr. Stone, assistant general manager. He was on duty regularly from 3 p.m. to 5:30 p.m., and all day Saturday.

Did he put electric trains through their best? He surely did!

When juvenile interest reached the buying point the young demonstrator would call in a sales person from above.

Over in a corner of the room, a special stand for display of electrical toy equipment for girls was established. This was made up of steps covered with cotton batting and artificial snow. Here electric toy ranges and vacuum cleaners in particular had attention.

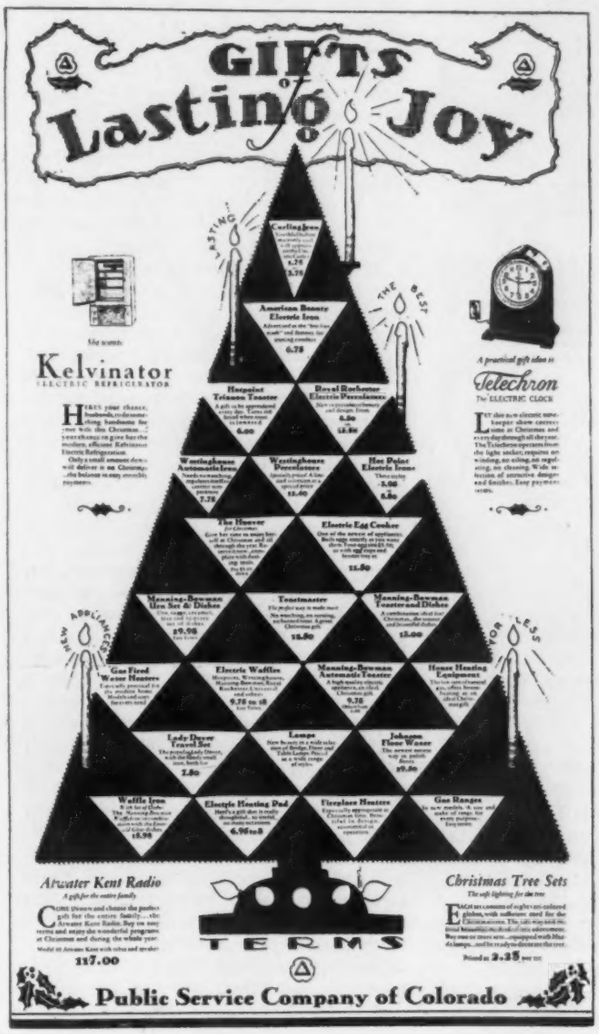
The department did a considerable business in toy train accessories such as bells, track crossings, and the like. The platform in the center provided display and demonstrations for four electric train sets of different sizes. One of the interesting phases of toy department experience was the sale of toy trains in considerable number to girls.



Trains in the foreground made the Ogden window of Utah Power and Light pull Christmas business into the store.

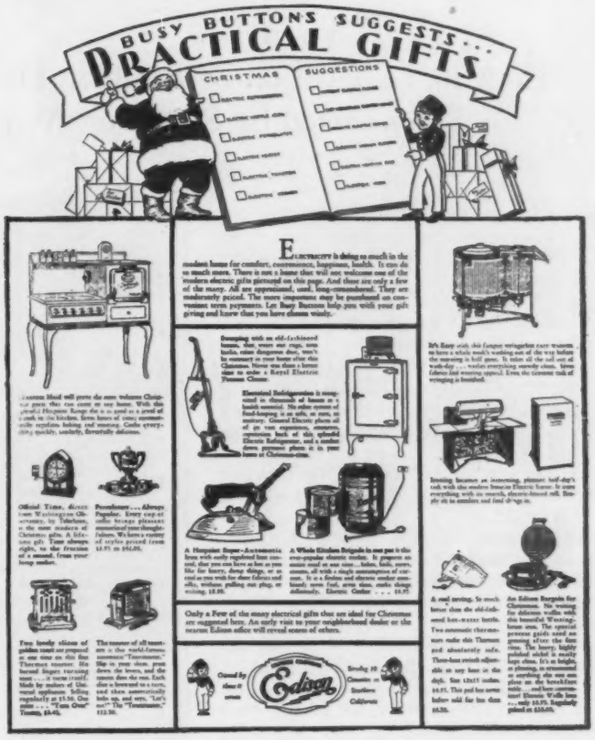
ADVERTISING CHRISTMAS BARGAINS

NOVELTY is never in such demand as in Christmas advertising, which must compete with the choicest advertising ideas of every type of trade. Newspaper advertising to be effective requires something like these.



A three-quarter-page-spread tree which told a complete sales story.

Welcome variation on the department store advertising theme is this two-thirds-page spread. Each appliance gets good spacing, description, and hence attention. White space is used effectively and good balance is preserved.



A prominent Electragist of Denver, fastening his idea to the tail of the Thanksgiving season bright star, sent the attractive folder pictured below to each of his customers and prospects last year. He took the opportunity to render thanksgiving for past patronage, urged them to decorate electrically during the coming holiday season, and suggested a list of appliances as gifts, and ended with a diplomatic solicitation for convenience outlet installations.

News of the Industry

Plan for Allocation of Boulder Dam Power Announced by Secretary Wilbur

Washington Correspondence

PUBLIC agencies and the utilities are equal beneficiaries under the plan for allocation of Boulder Dam power announced on Oct. 21 by Secretary of the Interior Wilbur, following a series of conferences with the applicants that extended throughout the preceding week. The representatives of the Southern California Edison Company regard the plan outlined by Secretary Wilbur as tentative and will be prepared to present further arguments regarding several features of the matter at the hearing which has been assigned for Nov. 12.

Spokesmen for the power company state that under Secretary Wilbur's decision the power will be divided in general on a 50-50 basis. This is declared to be satisfactory to them, although they contended at the outset of the conferences that in the allocation of power from the dam, a ratio of 81 per cent to the utilities and 19 per cent to the public agencies would be equitable, as that is the ratio which exists at present in the distribution of power. Secretary Wilbur's plan incorporates the proposal of the Southern California Edison Company that operation of the power plant shall be in the hands of a board of control on which the power company and the Metropolitan Water District of Los Angeles would have equal representation. It is expected that the Edison company will object to the provision of Secretary Wilbur's plan providing for one contract with the water district, supplemented by subcontracts between the water district and other applicants. The belief is expressed by representatives of the power company that it should be permitted to contract direct with the government for the power to which it is entitled.

As outlined by Secretary Wilbur, the power to be developed at the dam, subject to certain deductions, is to be contracted for as follows:

To the Metropolitan Water District of Southern California, 50 per cent, or as much thereof as may be needed for the pumping of Colorado River water.

To the City of Los Angeles, 25 per cent.

To the Southern California Edison and associated companies, 25 per cent.

These allotments are to be subject to certain deductions which may arise through the exercise of preference rights, as follows:

(*a*) Not exceeding 18 per cent of the total power developed for the State of Nevada for use in Nevada.

(*b*) Not exceeding 18 per cent of the total power for the State of Arizona, for use in Arizona, as above; and should either of the states not exercise its preference rights the other may absorb them up to 4 per cent.

(c) Not exceeding 4 per cent for muincipalities which have heretofore filed applications.

All such preference rights in whole or in part are to be exercised by the execution of valid contracts with the respective states and municipalities satisfactory to the secretary and the exercise of such preference rights is to reduce proportionately the foregoing allotments to the district, the city and the company.

Any state desiring to withdraw power within the limitations stated must serve on the Secretary of the Interior written notice within not less than twelve months of the amount of power desired, and for the purchase of which valid contracts satisfactory to the secretary must be executed.

Power contracted for but not required within a state shall be allocated to the City of Los Angeles and the Edison company on a 50-50 basis, with the reservation that it can again be called for within a reasonable time for use within the state. All power provided a state shall be at actual cost.

Should the 50 per cent allocated to the Metropolitan Water District be not required for pumping, the amount not needed is to be apportioned two-thirds to the City of Los Angeles and one-third to the Southern California Edison Company and associated companies.

Any municipalities desiring the power within the limitation prescribed must execute the necessary contract therefor within twelve months from the date the contracts are made with the district, the city and the company.

Any firm power available at the Boulder Dam for the payment of which other contractors do not become and remain liable, aside from that allocated to the Metropolitan District, shall be taken and paid for by the City of Los Angeles and the Edison company on a 50-50 basis.

The contract for the available power is to be made with the City of Los Angeles and the Metropolitan Water District, with other takers of power executing subcontracts with these two agencies. Provision is made for a board of control made up of two members nominated by the City of Los Angeles and the Metropolitan Water District, two by the Southern California Edison and associated companies, and one by the Secretary of the Interior, to act with the City of Los Angeles in the operation of the plant.

The federal government will install the dam, tunnels, power house and penstocks. The machinery for the generation and distribution of power is to be provided and installed by the lessees. The costs of installation and operation are to be borne by those contracting for the power in proportion to the amounts received. When the dam and power house are actually in operation the lessees may have the right to ask for a review of the actual cost of units of power and be entitled to deductions which still will permit a charge sufficient to return to the government all advances and interest in accordance with the Boulder Dam Act, and it is provided further that if such review indicates that a higher rate should be paid for power to meet the obligation to the federal government, such an advance in rate will be put into effect.

There will be a clause inserted in all of the contracts which will insure the distribution of all power developed at the Boulder Dam at such a price as in the opinion of the Federal Power Commission is fair to all consumers. Should certain municipalities operating their own power plants desire to make separate agreements with the City of Los Angeles and the Metropolitan Water District they shall be supplied with power at cost price.

The charge for storing water for the Metropolitan Water District will be 25 cents per acre-foot.

Edison Co. Will Not Protest Allocation

COMMENTING on the announced allocation of Boulder Dam power made by Secretary of the Interior Wilbur Oct. 21, R. H. Ballard, president of the Southern California Edison Company, said:

"The Edison company at this time has has no intention of filing any protest against the division of Boulder Dam power as proposed by Secretary Wilbur because the great necessity for water here is recognized and this company wants to co-operate in obtaining this water.

"The Edison company does not consider that it has been given as large an allotment of power as it should be given, but in the final analysis will make a saparate contract directly with the government on the matter of power."

West Joins World in

Light's Jubilee Celebration

THE anniversary of that October night 50 years ago when Thomas Alva Edison produced the first successful incandescent lamp was celebrated with fitting tribute to the great inventor throughout the world on Oct. 21, when Light's Golden Jubilee, begun officially at the convention of the National Electric Light Association in Atlantic City last June, reached its climax.

Mr. Edison himself participated in ceremonies held at Dearborn, Mich., attended by President Hoover and by men prominent in other industries that recognize Mr. Edison as their founder. Present also was a little group of men, most of them past the three-score mark —the Edison Pioneers—an organization made up of men who began their careers in the Edison laboratories prior to 1886. In the original little laboratory in which the incandescent lamp was born, which had been moved from Menlo Park, N. J., by Henry Ford, and set up at Dearborn, just as it was 50 years ago, Mr. Edison re-enacted the events of that night in 1879 when success crowned his efforts. The program was broadcast over an international hook-up.

The Pacific Coast joined with communities throughout the world in celebrating the Jubilee with special lighting displays, pageants, floodlighting of buildings and meetings of electric clubs and other organizations given over to the event.

Denver

Light's Golden Jubilee reached its climax in Denver with a "twin bill" observance on the night of Oct. 21 at the Municipal Auditorium and on Fifteenth St., one of the principal business thoroughfares. The auditorium was thrown open, under the auspices of the "Denver Post," for the benefit of those without radios and those unable to get home in time to hear the broadcasting from Dearborn. The memorable program, amplified by a public address system, was followed by the motion picture, "The Benefactor," showing Edison in the various stages of his career.

Immediately following this feature, the crowd adjourned to Fifteenth and Champa Sts., where a ceremonial platform had been erected to accommodate C. D. Vail, acting mayor of Denver, Clare N. Stannard, vice-president and general manager of the Public Service Company of Colorado, several industrial leaders, and a grid glow control device furnished for the occasion by F. A. Ferguson, local manager of the Westinghouse Electric & Manufacturing Company. A speeding airplane, sounding a klaxon, swooped over the thoroughfare, and sound waves, actuating the grid flow tube, treated the multitude to the spectacle of 123 500-watt lamps flashed on simultaneously—to dedicate the new permanent lighting system, completed earlier in the day, to Thomas A. Edison.

The Ferry Building Tower at San Francisco, bathed in colored light, paid tribute to Edison.

The week formally opened at the Denver Union Station, Oct. 14, where kerosene lamps illuminated dancers in costumes of 1879 until extravagant, ultramodern incandescence suddenly broke the gloom. Golden grapes glowed amid green, cast-iron leaves on pillar clusers, while giant domes of gold light radiated from above.

On Wednesday night, Oct. 16, an illuminated fire run—featuring fire apparatus since 1879—brought out a throng estimated at 50,000. On Friday night a 50,000,000-cp. illumination system at the municipal airport was dedicated to Mr. Edison by Governor W. H. Adams, by airplane broadcasting, illuminated planes and pyrotechnical displays aloft.

The various civic monuments and parks were symbolically lighted, and Sixteenth and Seventeenth Sts., embracing the banking and department store districts, were golden lanes of glory as a result of special installations rushed to completion at the last moment by the Public Service Company of Colorado.

San Diego

Light's Golden Jubilee was celebrated in the San Diego Stadium with an historic "Pageant of Light" on the night of Oct. 21. The pageant was arranged and presented through the aid of leading dancing and dramatic schools working in close co-operation with every phase of the electrical industry represented in San Diego. The history of light, beginning with the Stone Age and concluding with the invention of the incandescent lamp, was portrayed in six scenes supported with dance numbers and costumes representing the period of each set.

Seventeen naval searchlights were transported from the destroyer base to the stadium, which together with hundreds of floodlights, thearical spots and a few sun arcs, created an impressive climax to the evening's program. A feature of the grand finalé was a gigantic electric bulb framed in Neon tubing with lighting effects so arranged that a fade-out of various floods displayed a visionary character of Mr. Edison in the center of the bulb.

Following the program at the stadium the U. S. Navy presented a fitting tribute to Mr. Edison through a spectacular play of searchlights from all ships afloat in San Diego Bay.

Los Angeles and Vicinity

The Electric Club of Los Angeles paid its tribute to the genius of Thomas A. Edison at its regular meeting on Oct. 21, at which Dr. Robert A. Millikan, president of the California Institute of Technology, and a winner of the Noble Prize for physics, was the principal speaker. The meeting was given dramatic effect by the introduction of a spectacular lighting display.

Eighty-eight communities in southern California participated in a student Edison questionnaire contest which had

as its purpose the development of further interest in Light's Golden Jubilee. One of the newspapers in each of these 88 communities sponsored the contest. A questionnaire covering the life and work of Mr. Edison was published by each of these papers and schoolboys and girls up to the age of 15 were invited to send in replies.

Everyone who sent in a reply to the questionnaire received a small Edison medallion, and 22,000 of these emblems were distributed. The winner in each community was presented with a large Edison medallion.

Practically every service club in the territory served by the Southern California Edison Company had at least one meeting devoted to Light's Golden Jubilee. Between two and three hundred speeches were made by a large group of volunteer speakers gathered together for this purpose.

In many of the cities of southern California the mayor, by proclamation, urged participation in the Light's Golden Jubilee celebration. Street lights were augmented in many communities, for the celebration date, and every effort was made to carry out the spirit of the occasion.

Riverside

In honor of the inventor of the incandescent electric lamp, and as a perpetual memorial to him, the City of Riverside, Calif., brilliantly lighted the Sierras Cross and the Miller peace tower on the summit of Mr. Ribidoux on the night of Oct. 21, and will keep them illuminated each night throughout the years to come. Every public building was illuminated on that night and brilliant flares that shone over the entire city were dropped from a flotilla of bombing planes upon the city streets. A large gathering of Riverside's citizens attended a Jubilee program held in the municipal auditorium following the aerial light demonstration.

Pasadena

Colorado St. bridge, aching over a wide gorge of Arroyo Seco, in Pasadena, was completely floodlighted from one end to the other. Street lights in the downtown section were hooded with amber celoglass screens. Nearly all merchants had especially decorated windows and all public buildings were floodlighted. Exercises were conducted at the Rose Bowl, where field floodlighting for football games has been installed.

Salt Lake City

The celebration of Light's Golden Jubilee in Salt Lake City came to an impressive climax on the evening of Oct. 21 with the staging of a pageant having for its theme "Out of the Darkness Into the Light." In the business section one entire block was closed to traffic, and in this section, where a large stage had been erected, many thousands of citizens gathered to witness the enacting of this drama, and to participate in a street carnival which followed it.

Downtown windows were decorated in a fitting manner, featuring pictures of Mr. Edison, a number of downtown buildings were decorated with special lighting, and in the business section the street lamps sent forth golden light.

In the residence district a "home and garden lighting" contest was sponsored by the executive committee, and merchandise prizes were given for the most artistic displays. Souvenir Jubilee medallions were given to all entrants.

In the southeastern section of the city, known as the "Sugar House" section, the residents were particularly active in home and garden lighting decorations. The people of this community also staged a pageant similar to the one conducted in the business section of Salt Lake City.

At the Utah State Fair, held during the week of Oct. 6, one entire day was dedicated as Edison Day.

For several weeks prior to Oct. 21 a speakers' bureau functioned, and a number of addresses were given before various schools, civic and service clubs and churches.

Spokane

Light's Golden Jubilee was celebrated in Spokane with a varied program under the auspices of the Spokane Advertising Club and arranged by a special Light's Golden Jubilee committee, of which Dr. Edison Worthington, a cousin of the inventor and prominent in civic affairs, was chairman.

An outstanding feature of the Spokane program was an essay contest for school children on "What Edison's Lamp Has Done for Me." This contest resulted in more than 350 essays being submitted. In the four divisions of grades grand prizes of three-inch Edison medals were awarded while smaller medals were school prizes.

The Light's Golden Jubilee committee of Spokane furnished speakers for civic and fraternal meetings throughout the city during the week preceding Oct. 21. Many merchants featured special display windows commemorative of Light's Golden Jubilee.

Fresno

A public meeting in the San Joaquin Light & Power Corporation auditorium attended by more than 400 people, an open air concert of sacred music from the organ in the city's beautiful Roeding Park, and the spectacular floodlighting of 20-ft. portraits of Thomas Edison suspended on the sixth floor of the Pacific-Southwest Bank Building, were the high points of Fresno's Light's Golden Jubilee celebration.

The meeting in the San Joaquin Power auditorium, presided over by Mayor Z. S. Leymel, chairman of the local Jubilee committee, was featured by an address on Mr. Edison given by Dr. Frank S. Thomas, president of the Fresno State College.

At this meeting also, embryo Edisons from the Fresno schools exhibited mechanical or electrical contrivances which they had made themselves. In each group the first prize winner received a ¼-hp. electric motor as a reward. Over 125 entries were received in this contest.

Concealed floodlighting in Roeding Park bathed many of its large trees in soft light as several hundred people sat in the open to listen to a half-hour concert of sacred music as part of the Jubilee program. In the distance a fountain flashed all colors of the rainbow as hidden floodlights bathed its running waters.

San Francisco

In San Francisco, on the night of Oct. 21, the buildings of the Pacific Gas and Electric Company and The Pacific Telephone and Telegraph Company, and the Ferry Building tower, were resplendent with colored lighting effects. The San Fraicisco Electrical Development League devoted its luncheon meeting on that day to Mr. Edison, beginning the meeting by candle light, augmented later by coal oil lamps at the speakers' table, and ending in a blaze of electric light after a tableau had been shown of Mr. Edison watching over his first lamp. Ezra Decoto, former president of the California State Railroad Commission, and a member of the commission, was the principal speaker.

Portland

George L. Baker, mayor of Portland, acted as chairman of a sponsoring committee to have charge of the celebration of Light's Jubilee in that city. At a luncheon held at the Chamber of Commerce on Oct. 21 and attended by men prominent in official and business life, Franklin T. Griffith, president of the Portland Electric Power Company, in an address paid tribute to Mr. Edison and reviewed electrical progress during the past 50 years. A. C. McMicken, general sales manager, Portland Electric Power Company, acted as chairman of the day. A lighting demonstration beginning with candle light, then followed by oil lamps, and finally by illumination from a string of replicas of the original incandescent lamp, and reaching a climax in high-intensity floodlighting, lent dramatic effect to the program.

Seattle

In Seattle also a meeting of the Chamber of Commerce on Oct. 18 was dedicated to Thomas Edison, at which the principal speakers were H. J. Gille, general sales manager, Puget Sound Power & Light Company, J. D. Ross, superintendent of the City Light Department, and A. W. Leonard, president, Puget Sound Power & Light Company. The Electric Club of Seattle held Edison Day on Oct. 21, when the history of the electric light was reviewed by William Shoal, an electrical engineer. Full page advertisements were carried in Seattle newspapers by the Puget Sound Power & Light Company and the City of Seattle, respectively, in which Mr. Edison's achievements were extolled.

Power Rates to Be Reduced In Portland Dec. 1.

New reduced power rates in Portland, Ore., following studies carried on by the rate experts of the two utility companies with engineers of the Oregon Public Service Commission, the city attorney and the firm of Carey & Harlan, rate experts representing the city, are said to give Portland power rates competitively favorable in comparison with all cities of its class. The reductions apply also to Salem and Oregon City, Ore., Vancouver, Wash., and other towns in the Portland area served by the Portland Electric Power Company and Northwestern Electric Company, in which the existing Portland schedules apply, and will affect 4,000 customers.

New schedules separate power and lighting, which under the old schedules were combined, and are divided as to power customers using 15 kw. or less and customers using more than 15 kw. This separation of power and lighting is to make the schedules more readily comparable with schedules in other Coast cities. The existing combined light and power schedule will still remain in effect for those customers who, with a preponderance of lighting in their plants, might have to pay more under the new schedules. Accurate estimates have not been made as to the exact amount of saving that will be effected for the present power users.

The method of making these new rates was unique. In view of the long period of time that would be required to complete the investigation now being made of the Portland Electric Power Company's valuation and rates for all classes of service, the Public Service Commission, recently reorganized under the chairmanship of Frank J. Miller, urged a voluntary reduction in the power field with co-operation of the various interests involved. The schedules were prepared by J. P. Newell, consulting engineer, and C. R. Lester, chief engineer of the Public Service Commission, and by Carey & Harlan after a series of conferences with the rate engineers of the two companies. At a meeting of all the parties to the transaction, on Oct. 12, Franklin T. Griffith, president, Portland Electric Power Company, and Guy W. Talbot, president, Northwestern Electric Company, issued a joint statement announcing their agreement to the rates proposed and stated that revised tariffs would be filed to become effective Dec. 1.

In the meantime, the hearing on the valuation and rates of the Portland Electric Power Company is to commence as scheduled, Nov. 12.

The announcement of reductions was received with considerable acclaim in official and semi-official circles in the city due to the fairly prevalent belief that the existing power rates placed Portland in an unfavorable competitive position with respect to other Pacific Coast cities in its attempt to secure new industries.

Standard Oil Company Buys Coast Counties G. & E. Co.

Formal announcement was made on Sept. 30 by the Standard Oil Company of California that it had acquired control of the Pacific Public Service Company and its subsidiaries, of which the Coast Counties Gas & Electric Company, Santa Cruz, Calif., is one.

In issuing the announcement of the purchase, K. R. Kingsbury, president of the Standard Oil Company of California, made the following statement:

"It is the intention of the Standard Oil Company of California to retain the control lately acquired and there have been no negotiations for the disposition of control nor are any contemplated, rumors to the contrary notwithstanding. On the contrary, the Standard Oil Company contemplates the further development of the properties and hopes for the continued prosperity of the companies involved. With particular reference to reports of conflict with the interests of the Pacific Gas and Electric Company concerning the distribution of natural gas, the Standard Oil Company wishes to state that there is no conflict. The territory served by the Coast Counties Gas & Electric Company and by the Pacific Gas and Electric Company, respectively, has been outlined by the California State Railroad Commission.

"With reference to the Coast Counties Gas & Electric Company the Standard Oil Company plans to bring natural gas to the areas served by that company. It hopes that this will mark a new era of industrial development in those regions which will be of great benefit to the entire community."

The Coast Counties Gas & Electric Company serves communities in Santa Clara, San Benito and Santa Cruz Counties in California.

Power Companies of Washington Will Not Join In Opposing District Power Bill

IT IS NOT the present intention of the privately owned power companies of the state of Washington to wage any organized fight against the District Power Bill, an initiative measure which is to go on the ballot in November, 1930, according to a statement issued by A. W. Leonard, president of the Puget Sound Power & Light Company, Seattle. The issuance on Oct. 2 of the statement defining the power companies' attitude was caused by the fact that the Puget Sound company had joined with other power companies in filing an argument against the initiative measure with the Secretary of State, as all arguments for and against the measure had to be filed by Sept. 14. Mr. Leonard's statement follows:

"The power industry in this state is tired of bearing the brunt of continued political assault. It is tired of serving as a bumper to protect all other industries and businesses and the taxpayers generally from the attacks of those who are advocating public ownership of everything, regardless of costs and consequences.

"Our company joined with others of this state in signing an argument against Initiative No. 1, the so-called power bill, because the law required any argument that might be made to be in the hands of the Secretary of State not later than Sept. 14. We felt that this means of bringing a few facts to the attention of the voters should not be overlooked, but we have no plans for any such organized resistance as was made to previous measures which, like this initiative, were designed to put our industry out of business. We do not intend to let the politicians pose the industry as an object of public hostility.

"The avowed purpose of Initiative No. 1 is to take over all existing light and power properties in this state through the creation of an unlimited number of public utility districts. The only chance of its adoption lies in the possibility that the voters may neglect to read and study its provisions. It repudiates the theory that any publicly-owned utility can be self-supporting by expressly providing for a tax levy every year to cover losses in operation as well as an unlimited annual tax levy on all property for bond interest and redemption.

"These tax features alone should defeat the bill, but that is something for the taxpayers to think about. So far as the industry is concerned it does not stand to lose much except the privilege of paying heavy taxes on a vast amount of property, maintaining great payrolls, spending huge sums for labor and materials and otherwise contributing to the prosperity of the state. If the properties of our own company should be taken, for example, we will receive full compensation for them, whether purchased or condemned. As to this we can suffer no loss. Several hundred millions of dollars have been invested in this state by the light and power companies. Their expenditures for extensions and betterments alone average around $20,000,000 a year. This is equivalent to the establishment of twenty new industries every year with an investment of $1,000,000 each—the kind of business that every community is reaching out for. All this investment goes upon the tax rolls and helps carry the tax burden.

"If the people want to wipe all this out they must reckon on paying the bill, which will run something like this: First, the cost of acquiring the vast amount of private property; second, the cost in taxes sacrificed through taking all this property off the rolls; third, the

cost of new taxes to which they must submit in every utility district they create; fourth, the cost of setting up and maintaining an unlimited number of political organizations to do the work, free from any restraint or regulation in state or federal law.

"From this it will be seen that Initiative No. 1 calls for more thought on the part of the people than on the part of the private companies now in this field."

In commenting on the statement, Norwood W. Brockett, director of public relations for the Puget Sound company, said: "The statement does not mean that the companies will not prepare an analysis of the bill for distribution to their employees and at their offices and possibly to be enclosed with bills to customers. The statement does mean, however, that the companies refused to be forced into spending large amounts of money every so often by a few radical municipal ownership people and politicians."

The stated purpose of the proposed District Power Bill is to conserve the water and power resources of the state for the benefit of the people, and to supply public utility service, including water and electricity, for all uses. It authorizes the creation of public utility districts, comprising an entire county or any portion thereof, and permits the consolidation of two or more contiguous districts into one district.

The proposed act gives broad powers to the public utility districts. These powers include the right to construct and operate water works, irrigation systems, and power plants, either steam or hydro-electric; to purchase or condemn land within or without the limits of the district; to sell water or electrical energy within or without its limits and make its own regulations with respect thereto, free from any control of the department of public works; to issue general obligation or utility bonds; to levy an annual tax not exceeding 2 mills in any year, exclusive of interest and redemption of general obligation bonds; and "do all things necessary to carry on provisions of the act."

N.E.L.A. Convention Set for Week of June 16

Announcement has been made from the headquarters of the National Electric Light Association that the 53rd convention of the association will be held in San Francisco from Monday, June 16, 1930, to Friday, June 20. The convention will be held in the Municipal Auditorium. Consideration is being given to holding an exhibition of electrical machinery, equipment and appliances in connection with the convention. As this will involve the erection of a temporary structure for housing the exhibit, final decision on this point probably will not be made for several weeks.

For many years it has been customary for the association to hold a convention on the Pacific Coast once every five years, it having met in San Francisco in 1925, in Pasadena in 1920, and again in San Francisco in 1915 during the Panama Pacific Exposition.

U. C. Rural Electrification Course Set for Dec. 9-12

A short course in rural electrification, with lectures on subjects dealing directly with the uses of electricity in agricultural production, will be held Dec. 9-12 at the college of agriculture, University of California, Davis, according to Prof. B. D. Moses, of the university's Division of Agricultural Engineering, and director-secretary of the California Committee on the Relation of Electricity to Agriculture. The enrollment will be limited to 50, but no restrictions have been placed on the number of visitors.

Two laboratory periods will be held during the four days of the course, in one of which the students will conduct tests on irrigation and water supply pumps, and in the other of which they will make detailed studies of feed grinders and hay choppers and run a test on each.

Pacific Coast Electrical Association

Commercial Section Adopts Slogan as Committees Outline Work for Year

ADOPTING as its slogan "More Kilowatt-Hours per Customer," the Commercial Section of the Pacific Coast Electrical Association began its year's activities at the first conclave of the 1929-30 administration at the Alexandria Hotel, Los Angeles, Oct. 3-4. Attendance at the open meeting averaged 140 with the committee meetings particularly well attended.

E. B. Criddle, vice-president and general agent, The Southern Sierras Power Company, Riverside, and president of the P.C.E.A., gave the section its slogan at the first general session. He pointed out that the commercial department of the central station today stands first in power company activities with all other departments closely coordinated with it.

Welcoming the section to Los Angeles, W. L. Frost, general commercial manager, Southern California Edison Company, reviewed the last three years' commercial development in southern California. He stated that the average domestic consumption of his company had reached 614 kw.-hr. per year for the twelve months ending Aug. 30. Among the achievements reported by the Edison company have been the sale of 5,000 ranges, replacement of 540 gas engines with electric motors, the installation of 60,000 hp. in oil field equipment and 70,000 hp. in lighting equipment for the year 1929. He stated that air heating will be one of the most productive sources of new business in the future in southern California.

C. E. Houston, Southern California Edison Company, reported on the Commercial National Section executive committee meeting in Chicago. Merchandising practices and procedure of the power companies formed the principal subject for discussion at that meeting.

H. C. Rice, merchandise manager, Southern California Edison Company, speaking at the first general session, urged the central stations to cultivate the commercial attitude among municipal electrical inspectors, who are largely recruited from the engineering and construction forces of the industry. He pointed to the experience the Commercial Section has had in encouraging the adoption of the simplified range wiring specifications, which are now standard for 103 cities in California.

At the first luncheon meeting, A. M. Frost, general commercial manager, Great Western Power Company and San Joaquin Light & Power Corporation, and first vice-president of the association, gave the commercial men a statewide bogey of 1,000 kw.-hr. per home per year. He pointed out that wiring is the bottle-neck through which kilowatt hours must flow into the home and urged the industry to preach higher wiring standards.

The following are the programs adopted by the various bureaus and committees for the forthcoming year:

General Bureau—Will conduct an essay contest this year on the subject, "Better Home Lighting and What I Can Do to Obtain It." The contest will be open to power company employees and members of their immediate families.

POWER BUREAU

General Power Committee—Will study natural gas and Diesel engine competition. Will study rates applicable to the class of service where this competition is greatest. A special committee will also make further investigations of oil field electrification.

Industrial Heating Committee—Will produce a motion picture film of local industrial heating installations to supplement the films that are already available through the national industrial heating committee. Will also promote a Pacific Coast industrial heating school similar to the school that is held each year in the East. Will also investigate and suggest a statewide industrial heating advertising program.

Agricultural Power Committee—Will add new sections to the agricultural power handbook on farm wiring, dehydration, and one or two other subjects. Will participate in the short course for power salesmen and service men to be held at the University Farm, Davis, in December.

MERCHANDISING BUREAU

Refrigeration Committee—Will endeavor to develop further the co-operation between power

companies and refrigerator dealers and distributors. Will make a survey of employee use of electric refrigeration and will promote an employee refrigeration sales campaign.

Air Heating Committee—Will investigate thermostatic control of air heaters and the insulation of buildings. Will also make a survey of complete apartment house electrification in the state for the purpose of obtaining figures on cost of installation and operation.

Range Committee—Will exend the employee sales campaign to all branches of the industry. Will also study customer educational programs of various power companies.

Commercial Cooking Committee—Will continue the collection of data on new installations similar to that presented in the sales manual produced last year. Will also organize a speakers' bureau for carrying the commercial electric cooking story to bakers and restaurant men's conventions.

Appliance Committee—Will investigate methods used by power companies to create employee interest in appliance campaigns. Will study plans of various companies to put old appliances to work by either rehabitation or trade-in on new appliances.

LIGHTING BUREAU

Commercial Lighting Committee—Will push the Red Seal plan for commercial wiring developed last year in co-operation with the California Electrical Bureau.

Industrial Lighting Committee—Will gather and make available plans for industrial lighting campaigns as conducted by various member companies.

Domestic Lighting Committee—Will study and promote Christmas lighting activities in various communities in the state.

The second general session, Friday afternoon, consisted of a joint meeting between the Commercial Section and the Advertising-Publicity Section.

At a meeting of the executive committee held Friday morning, the date of the next commercial conclave was set as Jan. 9-10, 1930, at the Fairmont Hotel, San Francisco.

Main Advertising-Publicity Work Is Speaking Contest

Management of the National Employees' Speaking Contest to be conducted by the N.E.L.A. will be the principal work of the Advertising-Publicity Section of the Pacific Coast Electrical Association in California, Arizona and Nevada, it was decided at the first conclave of the section held at the Alexandria Hotel, Los Angeles, Oct. 4.

The subject for the contest is "The Electric Utilities' Contribution to My Community, State and Nation." The contest is open to all power company employees below the position of department head or manager. Under the rules set down by the national public speaking committee the delivery of the talk must not consume less than ten nor more than fifteen minutes. The treatment of the subject is to combine historical background with applications and conditions today. The first prize will be a tour of Europe during the summer of 1930. All expenses, exclusive of purely personal items, will be paid from the winner's residence to port of embarkation to Europe and return to home city. The second prize will be $500 and the third prize will be $250.

In the territory of the P.C.E.A. the contest will be conducted in two parts. The first will consist of southern California and Arizona, and the second of northern California and Nevada. Elimination contests will be held in each of the major central stations of the P.C.E.A. The Arizona elimination contest will be held at the convention of the Arizona Utilities Association in Phoenix late in April. Preliminary elimination contests will be held in northern and southern California to cut the field to four contestants for participation in the final contest to be held either in Los Angeles or San Francisco. A winner and an alternate will be selected at this final contest for participation in the national final to be held at a time and place to be announced later.

The Advertising-Publicity Section will publish pamphlets containing rules and information regarding the contest to be distributed by the company chairmen. Bulletin-board cards announcing the contest will also be prepared. In southern California the contest will be handled by R. G. Kenyon, vice-chairman of the section, and in northern California by George C. Tenney, chairman of the section.

Personnel for 1929-1930

The following list is the official personnel of the sections and committees of the P.C.E.A., given to "Electrical West" as of Oct. 24, 1929, by the secretary of the association:

GENERAL OFFICERS

E. B. Criddle, So. Sierras Pwr. Co., president.
A. M. Frost, S. J. L. & P. Corp., 1st vice-president.
Addison B. Day, L. A. G. and E. Corp., 2nd vice-president.
N. R. Sutherland, P. G. and E. Co., treasurer.
Samuel H. Taylor, P.C.E.A., secretary.

GENERAL EXECUTIVE COMMITTEE

Downing, P. M., P. G. and E. Co.
Fisher, R. E., P. G. and E. Co.
Frost, W. L., So. Cal. Ed. Co.
Gates, S. E., G. E. Co.
Harris, D. E., G. E. Supply Corp.
Holloway, A. E., S. D. Cons. G. & E. Co.
Hutchinson, C. T., McGraw-Hill Co.
Marshall, W. R., Westinghouse E. & M. Co.
Pike, E. D., Wagner Elect. Corp.
Pooler, Max, Tucson G., E. L. & P. Co.
Sharon, R. A., Gr. Western Pwr. Co.
Steel, Miles F., Benjaman Elect. Mfg. Co.

ACCOUNTING SECTION

EXECUTIVE COMMITTEE

P. R. Ferguson, So. Sierras Pwr. Co., chairman.
A. B. Carpenter, S. J. L. & P. Corp., vice-chairman.
Bourus, J. M., S. D. Cons. G. & E. Co.
Brown, R. H., So. Cal. Ed. Co.
Cannon, J. A., S. D. Cons. G. & E. Co.
Dayton, H. P., Sierra Pacific Pwr. Co.
Hodges, E. W., P. G. and E. Co.
May, C. C., S. D. Cons. G. & E. Co.
McCullough, D. A., Coast Counties G. & E. Co.
Painter, H., Tucson G., E. L. & P. Co.
Reynolds, L. A., Gr. Western Pwr. Co.
Rosenaur, E. J.
Simmons, E. N., L. A. G. and E. Corp.
Staal, C. P., So. Cal. Ed. Co.
Terry, H. T., P. G. and E. Co.

CLASSIFICATION OF ACCOUNTS COMMITTEE

Interpretation of Accounts Subcommittee
C. P. Staal, So. Cal. Ed. Co., chairman.

Construction Accounting Subcommittee
C. C. May, S. D. Cons. G. & E. Co., chairman.

CUSTOMERS' RECORDS COMMITTEE

Merchandise Sales Accounting Subcommittee
J. A. Cannon, S. D. Cons. G. & E. Co., chairman.

Customers' Billing Subcommittee
Ralph H. Brown, So. Cal. Ed. Co., chairman.

FIXED CAPITAL COMMITTEE

J. M. Bourus, S. D. Cons. G. & E. Co., chairman.

GENERAL RECORDS COMMITTEE

A. B. Carpenter, S. J. L. & P. Corp., chairman.

STATISTICS COMMITTEE

W. C. F. West, L. A. G. and E. Corp., chairman.

ADVERTISING-PUBLICITY SECTION

George C. Tenney, "Electrical West," chairman.
R. G. Kenyon, So. Cal. Ed. Co., vice-chairman.
Barnett, R. G., Coast Counties, G. & E. Co.
Berry, J. U., Valley Elec. Supply Co.
Booth, P. H., Edison Elec. Appliance Co.
Cyr, Wm. A., "Electrical West."
Foy, Fred C., S. J. L. & P. Corp.
Frost, A. M., Gr. Western Pwr. Co.
Frost, W. L., So. Cal. Ed. Co.
Garrison, Fred, So. Cal. Ed. Co.
Green, Sydney W., S. J. L. & P. Corp.
Jordan, J. Chas., P. G. and E. Co.
Joy, Al. C., Gr. Western Pwr. Co.
Morairty, A. F., Central Arizona L. & Pwr. Co.
Myrtle, Frederick S., P. G. and E. Co.
Nilsson, E. W., Westinghouse E. & M. Co.
Otterson, John W., McGraw-Hill Co.
Pollard, James F., P. G. ano E. Co.
Ramsay, E. P., L. A. G. and E. Corp.
Raymond, Forrest M., S. D. Cons. G. & E. Co.
Sanders, Milton G., Arizona Edison Co.
Scott, D. L., L. A. G. and E. Corp.
Smith, Richard E., So. Cal. Ed. Co.
Taylor, Samuel H., P.C.E.A.

COMMERCIAL SECTION

EXECUTIVE COMMITTEE

G. T. Bigelow, So. Sierras Pwr. Co., chairman.
E. G. Stahl, S. J. L. & P. Corp., vice-chairman.
Bevan, Frank, P. G. and E. Co.
Dellmann, G. H. P., S. D. Cons. G. & E. Co.
Ellis, E. M., G. E. Co.
Frost, A. M., Gr. Western Pwr. Co.
Houston, C. E., So. Cal. Ed. Co.
Jamison, J. H., Westinghouse E. & M. Co.
Morairty, A. F., Central Arizona L. & Pwr. Co.
McNeal, Myron, So. Cal. Ed. Co.
McWhinney, W. C., So. Cal. Ed. Co.
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Foy, F. C., S. J. L. & P. Corp.

MATERIALS COMMITTEE

F. M. Rondot, So. Cal. Ed. Co., chairman.
Hickman, S. E., S. J. L. & P. Corp.

REPAIRS COMMITTEE

J. B. Prewett, L. A. G. and E. Corp., chairman.
Brown, G. D., S. D. Cons. G. & E. Co.
Sanford, R. V., Tucson G., E. L. & P. Co.

ORGANIZATION DIVISION

S. B. Shaw, P. G. and E. Co., chairman.

EDUCATIONAL COMMITTEE

C. R. Stanley, P. G. and E. Co., chairman.
Casper, Albert, Vallejo Elect. Lt. & Pwr. Co.
Moulton, J. S., Gr. Western Pwr. Co.
Scott, D. L., L. A. G. and E. Corp.

LEGISLATIVE COMMITTEE

P. H. Ducker, So. Cal. Ed. Co., chairman.
Mason, D. P., Gr. Western Pwr. Co.
Richards, R. T., Central Arizona Lt. & Pwr. Co.

PERSONNEL AND REGULATIONS COMMITTEE

C. R. Stanley, P. G. and E. Co., chairman.
Thomas, F. S., Coast Counties, G. & E. Co.

TECHNICAL DIVISION

E. C. Wood, P. G. and E. Co., chairman.

BUILDINGS COMMITTEE

R. V. Dodge, Jr., S. D. Cons. G. & E. Co., chairman.
Rondot, F. M., So. Cal. Ed. Co.
Wood, E. C., P. G. and E. Co.

POWER DEVICES COMMITTEE

F. W. McGuire, Gr. Western Pwr. Co., chairman.
Bauer, W. H., So. Cal. Ed. Co.
Strong, A. E., Coast Counties G. & E. Co.

POWER TOOLS COMMITTEE

W. H. Fairbanks, So. Cal. Tel. Co., chairman.
Savage, L. A., S. D. Cons. G. & E. Co.

VEHICLES COMMITTEE

P. H. Ducker, So. Cal. Ed. Co., chairman.
Moulton, J. S., Gr. Western Pwr. Co.
Sanford, R. V., Tucson G., E. L. & P. Co.
Schaeffer, W. J., L. A. G. and E. Corp.
Thomas, F. S., Coast Counties G. & E. Co.

Meetings

Seattle Electric Club Elects Officers

At the annual election of the Seattle Electric Club, the following officers were elected for the ensuing year: President—Grover C. Burke, City Electric Company; first vice-president—James H. Kelly, Graybar Electric Company; second vice-president—Walter Funfsinn, Seattle Lighting Fixture Company; secretary-treasurer—P. L. Hoadley, Hoadley-Brooks Company; assistant secretary—C. O. Carver. The directors include: J. J. Agutter, J. J. Agutter Company; R. U. Muffley, Puget Sound Power & Light Company; Tom Wood, Packard Electric Company; and M. Cundall, Wagner Electric Company. The latter two were newly elected.

Coming Events

National Electrical Wholesalers Association, Pacific Division—Annual convention, Hotel Del Monte, Del Monte, Calif., Jan. 31-Feb. 1, 1930.

National Electric Light Association—Fifty-third convention, San Francisco, June 16-20, 1930.

Pacific Coast Electrical Association—Joint convention with National Electric Light Association, San Francisco, June 16-20, 1930.

Commercial Section meeting, Hotel Fairmont, San Francisco, Jan. 9-10, 1930.

Engineering Section meeting, Los Angeles, Jan. 16-17, 1930 (tentative).

Money Situation Reviewed at N.E.W.A. Meeting

The present financial situation and its effect upon sales of electrical products formed the chief subject of consideration at the only open meeting of the quarterly convention of the Pacific Division, National Electrical Wholesalers' Association, held at Hotel Del Monte, Del Monte, Calif., Oct. 3-5.

In the absence of Joseph Kline, president of the Pacific Division, D. E. Harris, vice-president of the Western region, General Electric Supply Corporation, presided at the meeting, held in the Copper Cup room on Saturday morning, Oct. 5. W. R. Marshall, Pacific Coast district manager, Westinghouse Electric & Manufacturing Company, was in charge of the program and the two speakers who addressed the meeting were J. F. Silverstein, San Francisco manager, Commercial Trust Company, whose subject was "Consumer Time Payment Financing," and George F. Kern, vice-president of the Crocker First National Bank, San Francisco, who spoke on "The Present Money Situation and Its Probable Effect on Future Business."

Players who distinguished themselves in the Pacific Division's regular quarterly golf tournament were James Crilley, who won the Manufacturers' Cup, Charles T. Hutchinson, winner of the Turney Trophy, Clarence Thompson, winner of the Roscoe Oakes Trophy, and William Kaemper, who won the honor of having his name inscribed on the famous Copper Cup. In the North-South tournament the South was the winner for the third successive time.

Northwest Electric Light & Power Association

Sections Organize for Year's Work and Appoint Committee Chairmen

APPOINTMENT of chairmen to head committees working under the four sections of the Northwest Electric Light and Power Association has been completed by the section chairmen and the work of the committees is rapidly getting under way.

At a recent meeting of the association executive committee, M. J. Wilkinson, Pacific Power & Light Company, Portland, chairman of the Accounting Section, outlined the scope of work for each of his committees, promising an active year for the section.

Appointment of bureau and committee chairmen announced by J. F. Orr, chairman of the Commercial Section, completes the organization of this section in so far as its executive committee is concerned.

The organization of subcommittees within the bureaus has not yet been announced by the bureau chairmen.

Organization of all the committees of the Engineering Section has been completed, according to D. W. Proebstel, Portland Electric Power Company, Portland, section chairman, and the program of work for the year was discussed and formulated at the first meeting of the section's executive committee, held in Portland the middle of September.

R. B. King, Idaho Power Company, Boise, chairman of the Public Relations Section, has completed the appointment of chairmen of the active committees in his section.

Complete personnel listings of all committees in the four sections of the association will be published in the Dec. 1 issue of "Electrical West."

Contractors, Dealers and Inspectors

Surprises Numerous at Electragists' Bakersfield Convention

WHATEVER else they may turn out to be, conventions of the California Electragists seldom fail to develop a number of surprises. The annual state convention held at Bakersfield, Calif., Oct. 19, 1929, lived up to this tradition with good measure.

Perhaps the most surprising event was the election of officers, upsetting the usually accepted procedure of advancing the vice-president to the presidency. Glen Arbogast, president of the Newbery Electric Corporation, Los Angeles, was the successful candidate for leadership of the state association for the next year. Frank McGinley, vice-president and in line for election, withdrew on account of duties as assemblyman to the State Legislature from his district.

Walter Vance, Pacific Electric Motor Company, Oakland, was elected vice-president and chairman of the Northern Chapter.

Mr. Arbogast has long been associated with contractors' and industry activities although during the past year or two he has held no official position with the association.

Other surprises came into the convention from unprogrammed speakers, from the frankness of the discussions and from the abundant entertainment features provided by the Bakersfield Electragists. For contractors only, and confined to a one-day, concentrated program, the convention broke all records for contractor-dealer attendance as well as for the number of wives and womenfolk attending. The completeness of the entertainment tendered the women by the Bakersfield women was an acknowledged triumph.

The first session plunged immediately into business session, President Edward Martin presiding.

The program was arranged by topics for discussion. Reports on those discussions follow:

Class A Contracting

Reporting for the Northern Chapter, George Eldridge, executive secretary, made these significant remarks:

"There is a very marked decrease in the building program of 1929. . . . A recent check (in San Francisco where 32 contractors are trying to qualify to do this work) shows each contractor would have done an average monthly gross of $734. . . . This is a result of oversaturation of the contractor field. . . . which is resulting in a terrific competition. . . . Price has become a criterion. Overproduction and oversupply . . . sold at a reduced price, have glutted the market and brought us to a profitless prosperity. This is the result of too many manufacturers, jobbers and contractors stepping outside of their natural or financial advantage, all of whom pride themselves on being big instead of being profitable. . . The problem as it affects the dealer should not be beyond control and by exercising self restraint could be very nearly overcome."

The fee system of letting contracts, whereby the builder furnishes all materials—which he seems to be able to purchase direct—and sometimes even pays all labor payrolls, and in which the contractor merely is paid a fee or

The Gartleys—Mrs. Gartley was hostess chairman to the women who attended the convention and Gene Gartley was one of the busy Bakersfield committeemen looking after arrangements. This picture, however, was taken at Ensenada on the famous boat ride.

percentage to run the job, was later discussed at the suggestion of Mr. Evans of Los Angeles. Although little was said on the subject, it was generally felt that the widespread extension of this means of letting electrical work would end the days of the electrical contractor as such and turn him into merely a labor foreman. The ability of a large operator to buy electrical supplies direct from jobber or manufacturer was declared to be the cause of this new and demolishing competition.

Bungalow and Apartment House Work

Speculative building, financed by companies or individuals interested only in resale and demanding electrical work on price alone, was agreed to be the root of an almost insurmountable problem. "The electrical contractor often finds himself a victim of the builder of this type who has everything in the way of security except money," declared Secretary Eldridge. "The contractor becomes," he said, "the poor snipe hunter who is holding the sack, for it is pretty sure to be true that these unscrupulous building contractors have left behind them many sad remembrances written on pieces of paper and commonly known as notes."

The new state licensing law in California for all types of contractors, which provides penalties for diversion of funds, abandonment of contract, departure from plans and specifications or violation of building codes or ordinances, was declared a boon to the legitimate contractor.

Mr. Eldridge opened up discussion when he declared that the contractor could sell more wiring and appliances to existing jobs by selling the Red Seal Plan. Mr. Gudie, secretary of an association of contractors doing the bungalow type of work in Los Angeles, presented the argument that the price for competitive work on speculative building was set by others outside the organized contractors, and that where the job was built up the owner often had difficulty in selling his finished building because public acceptance of the all-electric apartment or home had not reached a point where it could be sold.

This point was supported by the experience of many other contractors, who recited instances of having sold a builder an installation which he found could not be sold the purchaser of the finished property.

C. A. Rowley, Pasadena Electragist, was asked for experiences in building up installations with electric heat and range installations. After giving a modest description of his efforts he expressed an opinion that the Electragist should concentrate on two objectives: (1) To make plain to the architect and the builder the difference in methods used by the electrical contractor in figuring overhead and profit margins, which difference is not plain and which causes misunderstandings and lack of sympathy and appreciation of a contractor's costs; (2) to make an organized effort to have architects and builders let contracts not on the lowest figures presented but on the figure nearest the average of all submitted, which would cause greater accuracy and be eminently more fair to all concerned.

From his experience with an Electragist accounting system, H. L. Stolper, of Burbank, made the statement that "when the accountant shoves a complete analysis of a contractor's business under his nose each month that contractor will soon stop cutting prices."

It was to be gathered from the discussion of this topic that where contact with the owner or future occupant of a house is possible, the wiring requirements can be added to for greater adequacy and convenience. In speculative building, however, more drastic means are in need to make contracting even pay its own costs.

Motor Specialists

Frank Connolly, executive secretary, Southern Chapter, reported the results

of motor section activity both on the national and local situations. He described the motor specialists' state meeting in San Francisco, the paper drawn up in that meeting setting forth definite recommendations to manufacturers, the reception of that paper by the representatives of the manufacturers at the A.E.I. convention at Swampscott, and the attitude of understanding and appreciation of the contractor's problems exhibited by these manufacturing executives. Mr. Connolly stressed the importance of this contact between motor manufacturers and dealers. He felt that improvements in relations between them would result in improved relations between all dealers and national suppliers of wiring materials also. He urged formation of more motor section groups and intimated a possible national meeting in California during next year.

Merchandising

Improvements on nearly all fronts were reported in the merchandising situation. George Eldridge, reporting for the Northern Chapter, detailed progress in central station relations. Prices, as a rule, have been maintained, premium giving has been curtailed, installment terms have been rendered more equable, and on some classes of business the method of compensating salesmen has been revised to one less competitive and more conducive to cooperation from the dealers. Air heater manufacturers, too, he reported, have improved conditions by a new scale of discounts to builders and industrials.

Just what effect the extension of natural gas lines into hitherto electric territory and the advent of canned or bottled gas as a new competitor will have on electric merchandising could only be speculated.

H. H. Courtright, Valley Electric Supply Company, Fresno, who presided over the merchandising discussion, swiftly surveyed the new situations in which many industries find themselves because of newly developed competitions. He dramatized the pressure being put on all dealers in all lines, showing that to survive in any type of selling it is becoming increasingly necessary to specialize and to concentrate upon one or two related lines.

Mr. Connolly told of plans now under way in Los Angeles for a joint activity between the merchandising members of the Electragists and the Bureau of Power and Light in a big range selling campaign, in which the dealers will handle sales.

Credit Control

With Clyde Chamblin, past president of the A.E.I., presiding, the afternoon session opened with a discussion of credit control. Earl Browne, of San Francisco, manager of the California Electragists, related results of conferences with jobbers looking toward better credit control. Clyde Chamblin described a meeting which he declared made history, a meeting between national executives of jobbing organizations and Electragists seeking means to help the industry through a more careful extension and control of credit.

One of the surprises of the convention was sprung by Harry W. Biddle, attorney of Los Angeles, who has specialized on trade association organization and law. In a forceful and confident talk he described the legal limitations on the establishment of prices for intra-state commerce in California as being practically unhampered. With all of its population centers at or near the coast, practically all contracting commerce, he said, was intra-state. He described the Cartwright act and its subsequent revisions, which will allow the establishment of price scales which only require a determination that they are reasonable to make them lawful.

Mr. Biddle summed up the possibilities under California law for an association to (1) reach an agreement on fair price; (2) set penalties for violation of contract to maintain such a scale; (3) establish a scale of damages which will result to other members by failure to adhere to such a scale, and (4) set up an arbitration board to render judgment and enforce its provisions.

The National Convention

Both Clyde Chamblin and Harry Walker, delegates to the A.E.I. convention at Swampscott, described the activities and some of the more significant aspects of the national convention. Mr. Chamblin read his report as president of the A.E.I., summing up the contractor problems of the nation in their national aspects. He then listed the activities of the A.E.I. in national problems in which it acts on behalf of the contractor on subjects which affect his business either directly or indirectly.

Organization Activities

Reports from the secretaries on field work and individual activities of the various branches followed. Frank Connolly described the experiences of the Long Beach group in the interchange of information on accounts receivable, which revealed that the building contractors or other customers who owed the most owed everybody. When this fact became generally known, credit to such a customer was stopped automatically.

Mr. Connolly also described the recent negotiations which were designed to bring together as an Electragist group —although each organization would retain its individual field and identity— four different groups in Los Angeles. There are the Class A contractors, the intermediate group or that under Mr. Biddle and Mr. Gudie, the motor section and the newly formed merchandising section. Each is to be a section of the Los Angeles association, each self-governing, and self-supporting. They are linked on common problems only through representation on the central executive committee.

Fred White, assistant to Mr. Connolly, then told of reorganization of the San Diego group. He then described a series of meetings designed to bring the new commercial lighting Red Seal specifications to the attention of all contractors in the southern part of the state. George Rankin, field representative of the California Electrical Bureau, was the principal speaker, interpreting and explaining the provisions and the possibilities of the specifications. Speakers representing jobbers, power companies and manufacturers told of the sales possibilities and the Electragists conducted and promoted the meetings. To date 205 contractors have been reached and sold in seven meetings. Dates are set for fifteen more meetings in the next month.

George Eldridge's report for the Northern Chapter proved to be such an eloquent argument for membership that a motion was carried to have it printed and distributed to all contractors in the state.

Fred Church, new field secretary in the Sacramento Valley district, provided another surprise feature. In a deep reaching and revealing analysis of the forces crushing in upon the electrical contracting business, he said these "sound the doom" of the business unless it is changed to meet the new economic order of things. The biggest problem facing the contractor is the fact that to do anything he must organize so great a number of small irresponsible units. The economic jaws which are crushing are: (1) The productivity of industry, which is expressing itself in overstocks and consequent price wars, jobber and manufacturer invasion of the contractor-dealer's field; the pressure of sales and the high cost of selling. This, too, is developing matials to such an extent that less expert or experienced persons, even high school boys, can install ordinary wiring and remove the one thing a contractor has to sell, his skill and knowledge. (2) Over extension of credit—expressed in all lines. The money surpluses of the nation make financing money available for construction projects. This is bringing about a condition in which less and less building is financed or planned by the occupant of that building. This means a lessening chance to sell better

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Here's to Red Seal!

Dick Russell of Associated Wholesale Electric was really happy to present to Louis J. Meller, president of the Southeast Electric Club, at Huntington Park, Calif., this cup to be given the member doing the most Red Seal jobs this year.

jobs or to compete on any other than a price basis.

Mr. Church did not outline a remedy except that he stressed the fact that the best brains of the contracting business, represented by the Electragists, should be set to work to meet the problem and that action on it must come from the group. To this end every member must constitute himself a field representative for the association, he declared.

The last hour of the convention was spent in general discussion of collections, liens and laws to protect subcontractors' rights, a report of the Estimators Section by J. R. Wilson, and the election of officers. Adjourning to the city hall, the convention took part in the civic celebration of Light's Golden Jubilee, then met again in the most rousing banquet in the history of Electragist conventions.

Entertainment and publicity for the convention were handled in a way new to conventions by the Bakersfield Electragists and the Kern County Chamber of Commerce.

Camp & French, electrical contracting engineers, Sacramento, have moved from their shop at 1130 Ninth St., to much larger and more ample quarters at 1219 Twenty-eighth St. Increased shop facilities, where motor, hydraulic, pumping plant and mining machinery, as well as transmission line installation work, are being provided for. A complete line of merchandise is to be carried at the new premises also. The new place is outside of the busy traffic zone in which this company was located previously.

A Merger of the **Duncan Electric Company** and the **Globe Electric Company,** both of Spokane, Wash., under the name of **Duncan Electric, Inc.,** has been announced by C. E. Duncan, president. The new firm will occupy quarters in the Central Market at Main and Howard Sts., and will maintain a repair service shop at W 318 Sprague Ave.

J. H. Hilfiker has sold his interests in the **Eureka Electric Company,** at Eureka, Calif., and has established himself at Arcata, Calif., under the firm name of **Hilfiker Electric Company.** The firm does a general contracting and appliance sales business, and has absorbed the business formerly conducted by **A. Hof** in that city.

Sam G. Hepler recently announced the moving of his shop, the **Arrow Electric Company,** from 1924 Third St. to 1932 Ninth Ave., Seattle. A new building, with excellent facilities outside of the heavy parking district, has been made available by this move.

Vancouver, B. C., civic officials are taking action against the Restmore Manufacturing Company, in regard to the installation, without permit from the city electrical engineer, of an electrical element which is alleged to have caused a fatal explosion on this company's premises. J. H. Thomas, fire marshal, stated that the installation, which was in a bake oven, was made under hazardous conditions.

Personals

Eastern Connection Claims P. G. & E. Co. Engineer

ROBERT A. MONROE

ROBERT A. MONROE, assistant chief of the division of civil engineering of the Pacific Gas and Electric Company, San Francisco, has resigned and will leave California on Nov. 1 to accept a position in the hydraulic department of the Aluminum Company of America, with headquarters in Pittsburgh, Pa. No information on the title he will bear has been given out but he will occupy an important post of responsibility in the department and will report to J. W. Rickey, hydraulic engineer.

Mr. Monroe has been associated with the Pacific Gas and Electric Company for eighteen years, having entered the employ of the company upon graduation from the University of California in 1912. During the war he served as a captain in the Corps of Engineers and saw nearly two years' service overseas with the Fourth Regiment of Engineers. For the past four years he has acted as secretary-treasurer of the San Francisco Section, American Society of Civil Engineers.

Clyde L. Chamblin, president of the Association of Electragists International, Frank Connolly, field secretary, southern chapter, H. H. Walker, southern chapter, and Frank Sievers, northern chapter, California Electragists, and chairman of the National Motor Section, A.E.I., composed the California delegation attending the convention of the Association of Electragists International at Swampscott, Mass., Sept. 30-Oct. 4.

J. L. Brown, formerly owner of the Brown Electric Company, San Diego, Calif., has joined the staff of the San Diego Consolidated Gas & Electric Company's Electrical Happiness Store as San Diego representative of the Syracuse Washing Machine Company, distributor of the Easy Washer. He will be in charge of all washing and ironing machine sales.

E. M. Scofield, engineering contractor and head of the Scofield Engineering Construction Company of Los Angeles, has been appointed a member of the Los Angeles Board of Water and Power Commissioners. The appointment must be confirmed by the Los Angeles City Council before it becomes effective. Mr. Scofield succeeds **Will E. Keller,** who resigned recently.

Robert Follansbee, chief of the Water Resources Branch of the United States Geological Survey, Denver, Colo., represented the Colorado Engineering Council at the World Engineering Congress held in Japan during October.

George Kidd, president of the British Columbia Power Corporation, Vancouver, B. C., holding company for the British Columbia Electric Railway Company, has been appointed as the official delegate of the Canadian Manufacturers' Association to the conference of the Institute of Pacific Relations at Kyoto, Japan.

P. F. Apfel, of Seattle, who recently sold his interest in the Electric Heating & Manufacturing Company, of which he was president, has opened an office as an electric heating engineer at 529 Henry Building. Mr. Apfel has spent 30 years in technical investigation and design and manufacture of electric heating systems and devices.

C. N. Cone, of Dayton, Ohio, foreign sales manager for the Delco Light Company, and **E. A. Lowden,** Canadian manager, Frigidaire Corporation and Delco Light Company, were recent visitors to Vancouver, B. C. During their stay they conferred with Bruce Robinson Electric, Ltd., distributors of these lines in British Columb.a.

C. P. Dunn, who recently left a position as hydraulic engineer with the Portland Electric Power Company, Portland, to join the organization of the Aluminum Company of America, has been made chief engineer on the Saguenay development of the Aluminum company with headquarters at Arvida, Quebec.

Clark Baker, lighting specialist with the National Lamp Works of the General Electric Company, Oakland, visited the state of Washington last month and gave educational lectures on community and store window lighting in Bellingham, Everett, Yakima and Walla Walla.

R. K. Jones, formerly with the Seattle office of the Benjamin Electric Manufacturing Company, has recently joined the sales department of that company in San Francisco.

J. C. Scott, agriculturist of the Puget Sound Power & Light Company, Seattle, recently announced the appointment of the following farm electrification specialists to serve in various districts of the company in Washington: **V. P. McNamara,** formerly local agent at Ellensburg, to handle the district north of Seattle; **M. G. Cushing,** formerly local agent at Puyallup, to handle the central, southern and southwestern districts; **H. T. Hegg,** formerly foreman on the Hollywood Dairy Farm at Woodenville, to handle the northeastern district at Everett; and **Kenneth P. Jones,** a graduate of Washington State College and holder of a master's degree in agriculture from Iowa State College, to handle the eastern district at Wenatchee.

George W. Hawley, of Berkeley, Calif., has been appointed by Governor Young of California, to administer the State Dam Inspection Act, which was passed by the last Legislature. He will be deputy in the Division of Water Resources, headed by **Edward Hyatt,** state engineer. For more than ten years Mr. Hawley was with the East Bay Water Company, having been in charge of water supply investigation and construction. Since that time he has acted as consulting engineer for the Port Costa Water Company and the El Dorado Irrigation District.

George L. Myers, assistant to the president, Pacific Power & Light Company, Northwestern Electric Company and Portland Gas & Coke Company, Portland, was honored by the Pacific Coast Gas Association at its recent convention in Del Monte by being awarded a gold medal for the best paper presented at the Public Relations Section meeting. The subject of the paper was "Legislation Needed by Public Utilities." Mr. Myers was appointed chairman of the Public Relations Section of the Pacific Coast Gas Association for the coming year.

Shizuo Katoh, president of Denki-Gakko (The Institute of Electrical and Mechanical Technology), Tokyo, and editor of "Ohm," a magazine devoted to electrical engineering published in Japan, returned to Japan last month after an extended visit in this country during which he investigated American methods of public utility operation and American engineering educational systems. He attended the A.I.E.E. convention at Santa Monica in September.

L. E. Emerich, formerly Pacific Coast district manager in charge of general division sales of Leeds & Northrup Company, Philadelphia, with headquarters in San Francisco, has been made district manager of general division sales of that company in Chicago. **N. Cohn,** formerly at the main office and factory of the Leeds & Northrup Company at Philadelphia, has been appointed to succeed Mr. Emerich in the Pacific Coast district.

Obituary

D. L. Huntington Dies After Lingering Illness

DAVID LYNDE HUNTINGTON, for the past nineteen years president of The Washington Water Power Company and subsidiary companies in Spokane, died Sept. 27, following a lingering illness. While his illness had kept him from his desk for many months, he transacted important company affairs until the time of his death.

Mr. Huntington was a pioneer in the electrical industry. Following his graduation from Yale University with the degree of Ph.B., he entered the employ of the Thomson-Houston Electric Company in 1891. In 1892 he became affiliated with the General Electric Company as assistant engineer at Philadelphia. On Oct. 18, 1894, he left that company's employ to become treasurer of The Washington Water Power Company. He became general manager of the company in 1896, vice-president and general manager several years later, and in 1910 he was elected president. He also served as president of the Spokane United Railways from the time of its organization on July 1, 1922.

Mr. Huntington's business life was closely interwoven with that of his company and he was a pioneer in hydro-electric development in the Pacific Northwest. His courage and foresight

D. L. HUNTINGTON

resulted in the early extensions of power lines to serve the Coeur d'Alene mining and other outlying territories. Under his guidance the company has grown to serve ten counties of eastern Washington and six counties of northern Idaho with more than 52,000 accounts. The company now operates nine hydro-electric power stations with a total capacity of more than 250,000 hp.

Mr. Huntington was a fellow of the American Institute of Electrical Engineers, a member of the Yale Engineering Association, and a member of the National Electric Light Association.

Heart Attack Ends Career of C. S. Vance

CHAMP S. VANCE, vice-president of the Los Angeles Gas and Electric Corporation, died suddenly on Oct. 11 in his Los Angeles office from a heart attack. He was 65 years of age. Mr. Vance had been associated with the Los Angeles Gas and Electric Corporation for more than 30 years. In 1898 he entered the employ of the Los Angeles Lighting Company, one of the predecessors of the present lighting corporation, as a solicitor. Shortly after that he became chief solicitor, later special agent, and then manager of operation. In 1913 he was made vice-president and a director of the company, the position he occupied at the time of his death.

CHAMP S. VANCE

Thomas F. Delury, division commercial representative in San Francisco for The Pacific Telephone and Telegraph Company, died suddenly in that city while at lunch on Oct. 15. Mr. Delury was 51 years old and had been associated with the telephone company for 33 years, having joined the company as a clerk at the age of 18. He became San Francisco district manager of the company in 1920 and in 1926 was promoted to the position he held at the time of his death. Mr. Delury was a man of unusually large acquaintance in San Francisco and the Bay district and had made an outstanding success in promoting friendly relations between The Pacific Telephone and Telegraph Company and its patrons.

Paul Burt Munson, for the past five years manager of the Tacoma branch of the Westinghouse Electric & Manufacturing Company, died in that city on Sept. 26. Mr. Munson was for nine years connected with the Seattle office of the Westinghouse company, and prior to that he had been with the company in Minneapolis for two years. Up to the time of his death Mr. Munson had been an active member of the Tacoma Chamber of Commerce.

Manufacturer & Distributor

Hotpoint Announces Range Window Display Contest

Prizes totaling $175 are to be awarded in each sales district in an electric range window trimming contest open to dealers and central stations selling Hotpoint ranges, according to a recent announcement of the Edison Electric Appliance Company, Chicago.

The contest will be under way on Nov. 1 and will continue until Christmas. A first prize of $100 is offered to contestants in each district, a second prize of $50, and a third prize of $25.

The Pacific Coast district comprizes the states of California, Arizona, Oregon and Washington. Judges appointed to pick the winning windows in this section are George C. Tenney, "Electrical West"; Victor W. Hartley, California Electrical Bureau; and Fred W. Rea, Pacific States Electric Company,—all of San Francisco. The decision of the judges will be made from photographs of the windows, which will be identified by number only. Prize winners in each district will subsequently be judged in a national competition with all other district winners for a prize of $200.

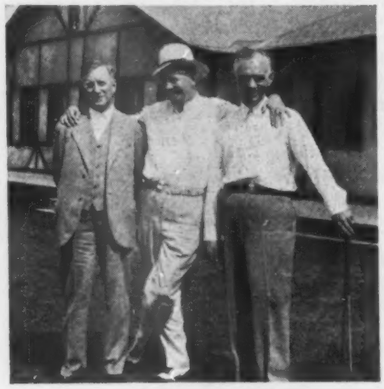
G-E to Furnish Campaign Aid to Utilities

To assist utilities in planning and conducting their campaigns on General Electric refrigerators, a campaign section has been added to the electric refrigeration department of the General Electric Company, at Cleveland, Ohio. A. A. H. Uhalt, who has been made campaign specialist, will conduct the activity, and requests for the service of his section should be addressed to him at 530 Hanna Bldg.

Statistical data and information on successful campaigns will be accumulated and made available to other companies for use in their campaigns. Personal contact before and during the campaigns will be a part of the service, and trained men will be assigned to address meetings, offer suggestions for publicity, store decoration and contests, and if necessary, will make actual calls on prospects.

Wesix Sales Representative Transferred to Southern States—William B. Bruere, formerly sales representative of Wesix Inc. in the East Bay division, has been promoted to the position of sales manager of the Southern Wesix Company, with headquarters at Birmingham, Ala. Mr. Bruere will have full charge of sales in seven southeastern states. Fred Hodge, formerly of the Pacific Gas and Electric Company, Oakland, has replaced Mr. Bruere in the East Bay territory.

Hot but Happy



L. W. Brownrigg, of San Francisco, C. J. James, of Los Angeles, and C. A. Pearl, of Portland, division managers of the Premier Vacuum Cleaner Company, of Cleveland, at the company's recent annual sales convention held at Association Island, N. Y.

Thor Appliance Salesmen in Contest—The champion salesman of the Thor organization is to be discovered through a $75,000 international sales contest now being carried on by the Hurley Machine Company, Chicago. The campaign started on Oct. 1 and will end on Dec. 24. Individual awards will increase in amount in proportion to the increase in sales. More than 8,000 Thor dealers have salesmen entered in the contest.

Curtis Lighting, Inc., Appoints Denver Representative—Curtis Lighting, Inc., lighting equipment manufacturer, has announced the appointment of Paul A. Douden as resident engineer in the company's Denver district. Mr. Douden's territory includes the states of Colorado, Wyoming and part of Idaho. His headquarters are at 1708 Sixteenth St., Denver.

Combustion Engineering Corporation, New York, has opened a district office in Seattle at Room 606, 1411 Fourth Ave. George M. Bechtel, formerly with the company's Los Angeles office, has been appointed branch manager of the Seattle office.

To Build Cross-Arm Factory—The Vancouver Cross Arms Company plans immediate establishment of a cross-arm factory in Vancouver, Wash., with a capacity of 20,000 ft. daily. The plant building will be 70 x 586 ft., electrically equipped throughout.

4,000 Clocks Without a Single Tick

THIS shipment of Telechron electric clocks arrived in San Francisco last month consigned from the Warren Telechron Company, Ashland, Mass., to the Pacific States Electric Company. The picture was taken on the Commonwealth Pier, Boston, just before the clocks were loaded on the "Alaskan" of the American Hawaiian Steamship Company for their journey westward. It was the largest shipment of Telechrons ever made.

New Building for Western Light and Fixture Co.

Construction of a new store, office and warehouse building at East Third and Garey Sts., Los Angeles, for the Western Light & Fixture Company is under way and the structure is expected to be completed by the middle of December. It will be a one-story brick building with a frontage of 160 ft. on East Third St., and 224 ft. on Garey St. Offices and store will front on East Third St., and storage, receiving and shipping departments will open on Garey Sts.

The plant will be modern in design and equipment throughout. There will be a special room for the display of commercial units, indirect lighting units and other fixtures and brackets. Along the wall leading from the store to the fixture room will be a line of sample boards displaying samples of the products regularly carried in stock. Directly beneath this row of sample boards will be a raised platform on which will be exhibited heavy projectors, floodlights, motors and other heavy appliances. Between the windows in the store will be dust and moisture-proof cases for showing shelf appliances, and there will be a facsimile of a dealer's show window always containing a current display of Mazda lamps.

Portland Office Opened to Handle Sales of Talking Movie System—A branch office of Electrical Research Products, Inc., has been established recently in Portland, Ore., with offices in the Yeon Building. R. E. Crouch, formerly of the Los Angeles office, is the district supervisor in Portland, and has as his engineering assistants O. Wible and H. A. Taylor. Portland sales and service of the Western Electric talking movie system handled by the company were formerly cared for through the Seattle office.

To Represent Allis-Chalmers in Portland—A. J. Schmitz has recently been established in Portland, Ore., by the Allis-Chalmers Manufacturing Company, as representative in the Portland territory. Mr. Schmitz came to Portland from Havana, Cuba, where he represented the company for eight years.

To Represent Pole Line Hardware Manufacturer—The Sierra Equipment Corporation, with offices in San Francisco, Los Angeles and Seattle, has recently been appointed Pacific Coast representative of the Oliver Iron & Steel Company, Pittsburgh, manufacturer of pole line hardware.

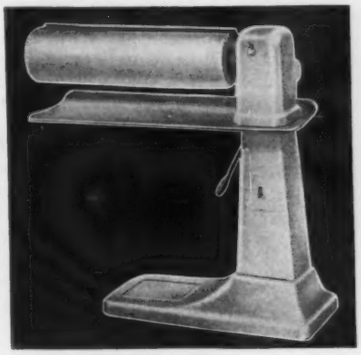
R. S. Edwards, sales manager of Edwards & Company, New York, manufacturers of telephone systems and devices, will spend the month of November on the Pacific Coast.

New Equipment

Springless Electric Clock

A low-priced springless electric clock that lends itself to practically any setting in the home is the Ravenswood model made by **The Hammond Clock Company**, 4115 Ravenswood Ave., Chicago. The case of the Ravenswood is made of Bakelite in natural mahogany brown finish. It has a convex crystal, silver-finished dial and sweep-second hand. It is also provided with a small flasher, a visual indicator that shows at a glance that the clock is running. The clock is 7 in. high, with a base 4 x 5½ in. and dial diameter of 3⅛ in. Retail price, $9.75.—Electrical West, Nov. 1, 1929.

Simplex Ironette



The new Simplex Ironette made by the **American Ironing Machine Company**, 100 East Ohio St., Chicago, is semi-automatic, with a full open head, heavily padded roll 26½ in. long. The shoe, using a Chromalox heating element, is chromium plated. An automatic pressure control keeps the pressure constant irrespective of the thickness of the material ironed. A pressing device stops the roll from turning, making it possible to press men's trousers, thick embroidery, etc., and the shoe turns back for steaming velvet. List price, $99.50.—Electrical West, Nov. 1, 1929.

Pillow Pad

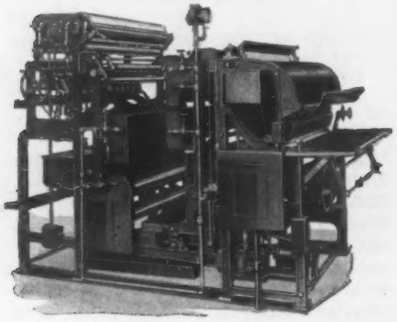
A new idea in heating pads is the Hotpoint pillow pad made by the **Edison Electric Appliance Company, Inc.**, 5600 West Taylor St., Chicago. A 12 x 15-in. Hotpoint 60-watt heating pad is contained within a pillow-slip of soft blue silk, the whole packed in an attractive display box. The pad has three heats controlled with two thermostats. List price, $12.50.—Electrical West, Nov. 1, 1929.

Ultra Violet Lamp

As easy to use as a desk light, and with a burner as simple as a light bulb, the Nu-Sol ultra violet lamp, manufactured by the Nu-Sol division of **Applied Research, Inc.**, 4753 Broadway, Chicago, is a departure from the usual sun-light lamp. Its burner is neither a carbon arc nor a mercury quartz arc, no mechanical adjustments or replacements are required, and the lamp's radiation is so filtered that no goggles need be worn by adults or children using it. Every lamp carries a certificate stating its exact ultra violet output, and is guaranteed for two years.—Electrical West, Nov. 1, 1929.

Blue Printing Machine

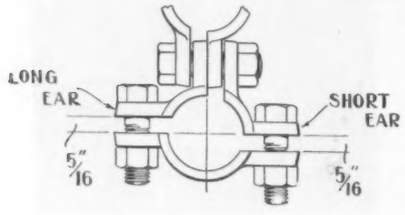
Speed of production, high quality prints, and low operating cost are features claimed for the new Peerless Model 30 blue-printing equipment of



The C. F. Pease Company, 813 North Franklin St., Chicago. This machine will produce blue-prints, negative prints, and blue line and brown line prints at a speed of 12 ft. per minute, and it is particularly adapted to long runs. Single prints, however, can be handled equally as well and as economically on the machine. In fact, the Model 30 can be operated separately from the washing and drying machine by means of a simple clutch adjustment, and it may be purchased separately if desired.

The Peerless Model 30 is made in two sizes, 42-in. and 54-in., and operates on either 110 or 220 volts d.c., or 220 volts a.c. The 42-in. machine is equipped with six lamps, and the 54-in. with seven lamps. These lamps are special Type P enclosed-arc style and consume 6½ amp. on d.c. or 7½ amp. on a.c. when adjusted for their most effective printing speed. — Electrical West, Nov. 1, 1929.

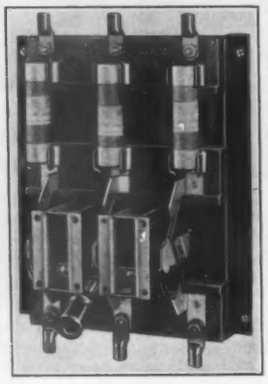
"Uniclamp" Pipe Fittings



A new line of pipe fittings known as "Uniclamp" has been developed by the **Delta-Star Electric Company**, 2400 Block, Fulton St., Chicago. The main feature of the fittings is that each has one short ear projection which lines up with the center line of the pipe and a long ear 5/16 in. from the pipe center line, the long ear of one clamp always fitting over the short ear of the clamp next to it. The net result is that with five pieces any combinations of pipes or braces can be secured. They are satisfactory for railing fittings where no braces are present.—Electrical West, Nov. 1, 1929.

Heavy-Duty Knife Switches

The construction of the mechanism in a new line of quick, double make and break, toggle type switches made by the **Paramount Electric Manufacturing Company**, 141 Tenth St., San Francisco, is based on the principle of compound leverage and is independent of the spring, which is used mainly to facilitate the throw rather than to actuate it. The movement of the blades is actuated by a lever handle pivoted externally of and pulling against the blade carrying yoke both ways, resulting in a combination so powerful that the "make" and "break" are positive and of lightning



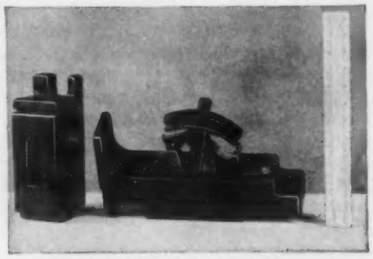
rapidity; no "beading" is possible and arcing is negligible.

An important safety feature of these switches is that if a spring should happen to break while switch is in contact, it can be disconnected by the operating handle. If, however, the breakage of a spring occurs when the switch is in "off" position, it cannot be connected until a new spring is inserted. The switches are approved by the Underwriters' Laboratories in 30-, 60-, 100-, 200- and 400-amp., 250- and 500-volt capacities.—Electrical West, Nov. 1, 1929.

Capped Bushing

Capped bushings, or as they are sometimes known, "bushetts," have been added to its line of electrical specialties by the **Steel City Electric Company**, 1207 Columbus Ave., Pittsburgh, Pa.—Electrical West, Nov. 1, 1929.

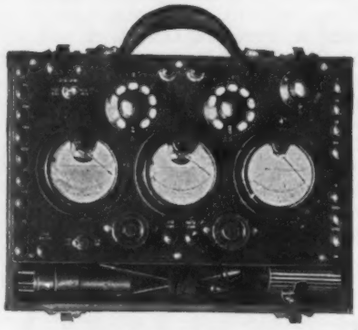
15-Amp. Deion Type Circuit Breaker



A 15-amp. circuit breaker based on the Deion principle has been placed on the market by the **Westinghouse Electric & Manufacturing Company**, East Pittsburgh, Pa.

This device replaces the conventional panelboard toggle switch and fuse. When an overload occurs on a branch circuit this breaker opens automatically and can be immediately reclosed provided the overload condition is not sustained. The automatic release is secured through the action of a bimetallic thermal element which engages the releasing latch of the mechanism.—Electrical West, Nov. 1, 1929.

Radio Set Tester



To meet the more advanced servicing needs of radio's latest developments, the **Weston Electrical Instrument Corporation**, Newark, N. J., has designed the Model 547 radio set tester. The tester is contained in a rugged Bakelite case provided with a carrying handle and a compartment for housing the set accessories and a few small tools. It has a removable, snap-on cover, and the overall size of the case is 12⅜ x 9 x 3¾ in., and the weight approximately 10 lb.

The instrument equipment consists of three 3¼-in. diameter Weston models—an eight range d.c. Model 301 for 750, 250, 100, 50, 10 and 5 volts, 100 and 5 milliamperes; a double range d.c. Model 301 for 100 and 20 milliamperes; and a five range a.c. Model 476 for 750, 150, 16, 8 and 4 volts.—Electrical West, Nov. 1, 1929.

Air Cooled Heater Plug

A new heater appliance plug that uses the air cooling principle to prevent excessive heating is announced by the **Belden Manufacturing Company,** Chicago. This plug is made for use with electric irons, toasters, heaters and other appliances using universal plugs.

The plug is provided with air vents which radiate the heat before it reaches the switch or wire connections, and consequently connections are kept at a

low temperature. According to the manufacturer, the plug is never too hot to handle even after being in service all day. Clips of Monel metal provide perfect contact and eliminate arcing which causes so much heat. This alloy retains its resilience even when subjected to high temperature over a long period.

The Belden aircool heater appliance plug is constructed of durable black Bakelite. Handy switch buttons are in red and black. It can be installed as simply as any other heater plug.—Electrical West, Nov. 1, 1929.

Display Case for Star-Rite Heating Pads

With the purchase of six Star-Rite heating pads, **The Fitzgerald Manufacturing Company,** Torrington, Conn., is offering to dealers this lithographed sampler display case in mahogany

finish. A sliding glass panel permits the showing of a delicately colored heating pad with positive insurance against loss from either dust or handling. The size of the case is 12¼ x 7½ x 10 in.—Electrical West, Nov. 1, 1929.

G-E Sun Lamp

A new home-type sun lamp has been introduced by the merchandise department of the **General Electric Company,** Bridgeport, Conn.

The bulb of the lamp is of special glass that eliminates the shorter ultraviolet rays which, it is said, should be used only under the supervision of a physician. The special glass of the bulb is so designed as to permit only the passage of beneficial rays corresponding to direct sunlight through a clear atmosphere in midsummer. Goggles and other protective devices, therefore, need not be worn.—Electrical West, Nov. 1, 1929.

Recent Publications

Rigid Steel Conduit—"Youngstown Buckeye Conduit" is the name given to a catalog just issued by **The Youngstown Sheet and Tube Company,** Youngstown, Ohio. The catalog gives price lists and shows many buildings and industrial plants where this conduit has been installed.

Johns-Manville Materials — "Johns-Manville Service to the Electrical Industry" is the title of a brochure describing asbestos ebony, electrobestos and transite—products of the **Johns-Manville Corporation,** 292 Madison Ave., New York, used in the manufacture of electrical apparatus.

Threadless Fittings—A supplement to its fifth edition catalog has been issued by the Kondu division of the **Erie Malleable Iron Company,** Erie Pa. This supplement gives complete data on Kondu threadless fittings and contains an index of the full catalog with list price of each item.

Combustion Engineering Catalog—A revised edition of its General Condensed Catalog GC-5 of fuel-burning and steam-generating equipment has been published by the **Combustion Engineering Corporation,** 200 Madison Ave., New York.

Valves and Fttings—A new Reading-Pratt & Cady catalog, covering Pratt & Cady iron and bronze valves, asbestos-packed cocks and Reading cast steel valves and fittings, has been issued by the **Reading Steel Casting Company, Inc.,** Bridgeport, Conn.

Exterior Lighting—Ornamental Street Lighting Design Book No. 101 is a recent publication of **The Union Metal Manufacturing Company,** Canton, Ohio. The book illustrates a large number of designs of street lighting standards using "King Ferronite" metal. Another recent publication of this company is Catalog No. 59 of exterior lighting fixtures illustrating designs executed in pressed steel and in cast iron.

Buried Transmission Cable—A six-page folder has recently been issued by the **American Steel & Wire Company,** 208 South La Salle St., Chicago, bearing the title "An Achievement in Power Cable Transmission Efficiency." The folder describes a unique installation made by this company for the Tennessee Coal, Iron & Railroad Company of Birmingham, Ala.

"Electrically Heated Stereotype Pots as Load Builders"—This is the title of an illustrated booklet recently published as a serial report of the industrial heating committee of the National Electric Light Association. Copies may be obtained from the association, 420 Lexington Ave., New York, at 40 cents apiece; price to members, 25 cents.

Electric Furnaces—A bulletin recently prepared by the **Bellevue Industrial Furnace Company,** 2971 Bellevue Ave., Detroit, describes that company's electric furnaces for industrial heating processes.

Squirrel-Cage Motors—Seven types of squirrel cage motors are discussed and compared in a new 24-page bulletin, No. 165, recently issued by the **Wagner Electric Corporation,** 6400 Plymouth Ave., St. Louis, Mo.

Electric Heat—Radia electric heaters, wall-insert type and portable type, are described in a catalog recently issued by **The F. W. Shepler Stove Company,** Pittsburgh, Pa. List prices are included.

General Electric Publications—Recent publications issued by the **General Electric Company,** Schenectady, N. Y., include the following:

Three booklets issued by the Outdoor Switching Equipment Division describing hook-operated disconnecting switches, (GEA-1,004A), insulators (GEA-1,122), and group-operated, tilting-insulator switches (GEA-1,003A).

"Electric Furnaces for Industrial Use"—GEA-1146.

"Electric Heat in Industry"—GEA-261A.

"Motor Drives for Rolling Mills"—GEA-151B.

"Gas-Electric Drive for Buses and Other Automotive Vehicles"—GEA-149C.

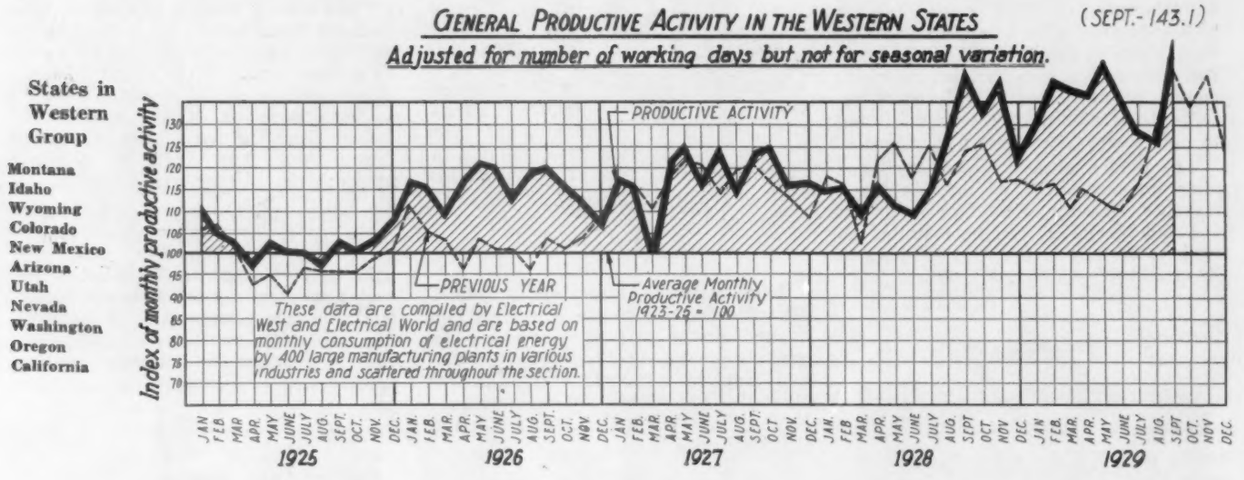
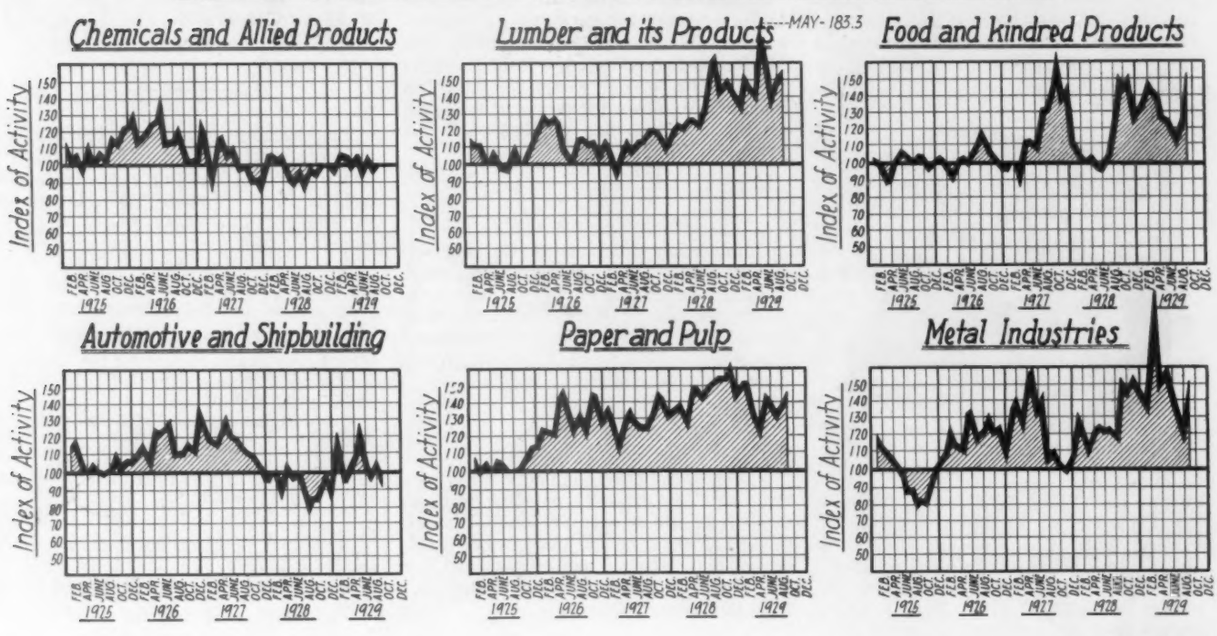
"Surface Air Coolers"—GEA-226A.

ELECTRICAL WEST Barometer of Industrial Activity in Western States

THAT the operations of the manufacturing plants of the Western states as a whole are operating about on the same plane as at this time last year is indicated by reports received on the consumption of electrical energy for power purposes. The September rate of activity was 12.7 per cent above August, but was 0.2 per cent under September last year. The rise from August to September is to be expected at this time of the year, and the increase this year is about the same as reported for the same period last year. The average rate of operations of these plants during the first nine months of the year was 13.8 per cent above the same period in 1928.

These conditions in general manufacturing reflect very closely the national situation. In the country as a whole the rate of operations during September was about 1 per cent over September last year. The average rate of operations of these plants during the first nine months of the year was 10.5 per cent above the same period in 1928.

A study of the various industrial groups operating in the Western states indicates a wide variation in trend. Four of the leading industrial groups report increases over last year, chemicals and allied products reporting a 5 per cent increase, food products 0.5 per cent, shipbuilding 12.4 per cent, and the stone, clay and glass group 20.1 per cent. On the other hand, four equally important manufacturing groups of the West report a September rate of activity under that reported for September last year, the rubber products industry leading the curtailment with a drop in productive activity of 8 per cent, followed by paper and pulp with 6 per cent, forest products 5.8 per cent, and the metals group with a drop under last year of 0.8 per cent.

Indexes of Industrial Activity in the Western States
(All figures adjusted for number of working days.)

	Sept. 1929	Aug. 1929	Sept. 1928	Av. 1st 9 mos. 1929	Av. 1st 9 mos. 1928
All industry	143.1	127.0	143.4	136.4	119.9
Chemical and allied products	99.3	95.7	94.6	97.8	96.9
Food and kindred products	153.0	124.5	152.3	134.8	112.9
Metals group	151.4	123.8	152.6	152.6	125.9
Forest products	153.6	151.0	163.0	153.9	134.5
Paper and pulp	146.4	139.0	155.7	141.8	145.2
Rubber products	147.7	154.0	160.5	186.1	150.9
Shipbuilding	91.3	106.4	81.2	104.3	89.8
Stone, clay and glass	157.0	123.5	130.7	141.5	143.9